In the NPRM, we proposed that, for LDV/LLDTs, all bins with NO_X values over 0.20 g/mi would expire at the end of the 2006 model year when there are no longer any interim LDV/LLDTs. Table IV–B.–4 shows that the two highest bins, bins 9 and 10, which were derived from NLEV and included to smooth the transition from NLEV to the interim program will be unuseable for LDV/LLDTs after 2006—the last year of the LDV/LLDT phase-in. Otherwise all bins will remain viable for the duration of the Tier 2 program unless altered by another rulemaking.

We proposed to align the useful life periods for interim standards with those of the Tier 2 standards (full useful life of 120,000 miles), as discussed in Section V.B. below. The end result of this proposal would have been that all LDV/LLDTs—whether in the Tier 2 program or interim program—would go from 100,000 mile useful lives to 120,000 mile useful lives in 2004. However, manufacturers were extremely concerned about the certification workload burden for 2004. They commented that they would be unable to carry any of their LDV/LLDTs over from 2003 and that they would have to recertify all of their vehicles in 2004 and then likely recertify them again as they were phased into the Tier 2 standards. Therefore, based upon comments, we are finalizing that useful lives of the interim LDV/LLDTs may remain at 100,000 miles. Our reasons for this change are discussed in greater detail in Section V.B.

We are finalizing as proposed a corporate average full useful life NO_X standard of 0.30 g/mi for this interim program. This standard is derived from the NLEV program and represents the full useful life NO_X standard in NLEV that is associated with LEV LDVs and LDT1s. LDVs and LDT1s will already be at this level, on average, under the NLEV program. LDT2s are subject to standards that effectively impose a NO_X average standard of 0.5 g/mi under NLEV, but we believe they should readily be able to meet the 0.30 g/mi average especially since they can be averaged with the LDVs and LDT1s. To aid LDV/LLDTs in meeting the 0.30 g/mi corporate average NO_X standard in the interim program, we are providing an optional NMOG value for LDT2s certifying to bin 9 (where the NO_X standard=0.3 g/mi). This option is only for LDT2s, and only for those produced by manufacturers that elect to comply with the interim requirements for all of their HLDTs for the 2004 model year (see next section). The optional NMOG values for qualifying LDT2s are 0.130 g/mi at full useful life and 0.100 at intermediate useful life.

The 0.30 g/mi corporate average NO_X standard will apply only to non-Tier 2 (interim) LDV/LLDTs and only for the 2004–2006 model years. Manufacturers will compute, bank, average, trade, account for, and report interim NO_X credits via the same processes and equations described in this preamble for Tier 2 vehicles, substituting the 0.30 g/mi corporate average standard for the 0.07 g/mi corporate average standard in the basic program. Also, EPA will condition the certificates of conformity on compliance with the corporate average standard, as described for Tier 2 vehicles. These NO_X credits will be good only for the 2004–2006 model years and will only apply to the interim non-Tier 2 LDV/LLDTs. Credits will not be subject to any discounts, and credit deficits can be carried forward as described under Section IV.B.4.d.vi. above.

NMOG credits from the NLEV program can not be used in this interim program in any way. NO_X credits generated under this interim program will not be applicable to the Tier 2 NO_X average standard of 0.07 g/mi because of our concern that a windfall credit situation could occur. This could happen because credits are relatively easy to generate under a 0.30 g/mi standard compared to generating credits under a 0.07 g/mi standard. As we indicated in the preamble to the NPRM we believe the application of credits earned under the interim standard to the Tier 2 standards could significantly delay the fleet turnover to Tier 2 vehicles. We do not believe there is a need or that it would be appropriate to allow such a delay. The requirements of the interim program will be monitored and enforced in the same fashion as for Tier 2 vehicles.

For the reasons cited above, we believe it is appropriate to extend interim, NLEV-like standards beyond 2003 as a mandatory program and to bring all LDVs and LLDTs within its scope. Manufacturers have already demonstrated their ability to make LDVs and LLDTs that comply at levels well below these standards. As the interim standards for LDV/LLDTs are essentially 'phase-out'' standards, we did not propose and are not finalizing early banking provisions for the interim LDV/LLDTs.

ii. Interim Exhaust Emission Standards for HLDTs

We believe these interim standards are necessary and reasonable for HLDTs. While these trucks make up a fairly small portion of the light-duty fleet (about 14%), their current standards under Tier 1 are far less stringent than the NLEV standards that apply to current model year LDVs and LLDTs. Given the delayed phase-in we are finalizing for HLDTs, we believe it is appropriate to require some interim reductions from these vehicles. Further, manufacturers have already demonstrated their ability to meet these interim standards with HLDTs. These standards are a reasonable first step toward the Tier 2 program and will provide meaningful reductions in the near term relative to current certification levels under the Tier 1 emission standards.

We also proposed interim standards to begin in 2004 for HLDTs. These vehicles are not included in the NLEV program and will be subject only to the Tier 1 standards prior to today's rule taking effect. Tier 1 standards permit NO_X emissions of 0.98 g/mi for LDT3s and 1.53 g/mi for LDT4s. We are finalizing these standards generally as proposed; to address statutory lead time requirements, we are offering two options for the phase-in of HLDTs to the interim standards. Manufacturers can choose between either of these two options:

(Option 1) Like we proposed in the NPRM, manufacturers must bring their entire production of 2004 model year HLDTs under the interim requirements and phase 25% of them into the 0.20 g/mi fleet average NO_X requirement, followed by 50% in 2005, 75% in 2006, and then 100% in 2007; or

(Option 2) We are including this option to address statutory lead time requirements for HLDTs. In the case of 2004 model year test groups whose model years commence *before the fourth anniversary* of the signature date of today's rule, the manufacturer may exclude those test groups from the interim HLDT provisions of the rule. In the case of 2004 model year test groups whose model years commence *on or after the fourth anniversary* of this rule's signature, the manufacturer must bring all such HLDTs under the requirements of our interim program, and all such vehicles or 25% of the manufacturer's sales of 2004 model year HLDTs, whichever is less, must comply with the corporate average NO_X standard of 0.20 g/mi. The manufacturer must then bring all of its HLDTs into the interim requirements beginning with the 2005 model year including a 50%, 75%, 100% phase-in to the 0.20 g/mi fleet average NO_X standard beginning that year. The beginning of a test group's model year is determined under section 202(b)(3) of the Act and 40 CFR Part 85 Subpart X.

Our final rule is consistent with the requirements of the Act because manufacturers won't have to phase-in HLDTs until the model year that commences four years from the signature of this rule if they don't want to. However, to provide incentive for manufacturers to comply with the interim requirements for all of their HLDTs beginning with the 2004 model year, *i.e.* to elect Option 1, we are finalizing a provision to permit those manufacturers to use higher NMOG values in two situations. Manufacturers electing to meet the interim requirements for all of their 2004 model year HLDTs including the 25% phase-in number must so declare in their 2004 model year HLDT certification applications. They may then:

- Use a full useful life NMOG value, through the 2008 model year, of 0.280 g/mi for LDT4s certified to bin 10 (0.195 g/mi at intermediate life); and
- Use a full useful life NMOG value, through the 2006 model year, of 0.130 g/mi for LDT2s certified to bin 9 (0.100 g/mi at intermediate life).[70]

In the case of the LDT4s, the optional NMOG standard will enable manufacturers to more easily meet our interim HLDT NO_X standards, the highest of which (0.6 g/mi) is one-third tighter than what will be required in California under Cal LEV I through 2006. For the LDT2s, the optional NMOG standard will help manufacturers certify more LDT2s to bin 9 (0.3 g/mi) than they likely would otherwise (they would probably certify some LDT2s to bin 10 where NO_X=0.6 g/mi). Therefore, both of these optional standards are consistent with our goal to achieve important early NO_X benefits from our program.

Except for the application of the new option described above, the interim standards for HLDTs will apply as proposed, and will phase-in through the 2007 model year, as shown in Table IV.B.–2. We are finalizing the proposed corporate average full-life NO_X standard of 0.20 g/mi for interim HLDTs.

[70] Manufacturers must cite this declaration in their LDT2 certification applications for the 2004–2006 model years and in their LDT4 applications for the 2004–2008 model years. If manufacturers employ alternate phase-in schedules that begin prior to 2004, they must also make the declaration in each applicable year before 2004.

Manufacturers will comply with the corporate average HLDT NO_X standard by certifying their interim HLDTs to any of the full useful life bins shown in Table IV–B.–4. Where applicable, manufacturers will also comply with the intermediate useful life standards shown in Table IV.B.–5. Interim HLDTs not needed to meet the phase-in percentages during model years 2004–2006 will have to be certified to the standards of one of the bins in Table IV.B.–4 (and –5), and NO_X will thus be capped at 0.60 g/mi. These trucks will not be included in the calculation to demonstrate compliance with the 0.20 g/mi average.

At the end of each model year, manufacturers will determine their compliance with the 0.20 NO_X standard by calculating a sales weighted average of all the bins to which they certified any interim HLDTs, excluding those not needed to meet the applicable phase-in requirements during 2004–2006. The excluded trucks must comply with the standards from one of the bins in Table IV-B–4 (and –5) which effectively caps their emissions at 0.60 g/mi.

For HLDT test groups that are not subject to the phase-in in model year 2004 under Option 2 above, the same requirements as described above apply except that there are no new standards for these vehicles in the 2004 model year. Also, the optional higher NMOG values for LDT2s and LDT4s do not apply for any manufacturer that uses Option 2.

Given that the interim HLDT standards are ''phase-in'' standards through 2007 (as opposed to the interim LDV/LLDT standards, which are ''phase-out'' standards), we are including provisions that manufacturers may employ alternative phase-in schedules as proposed for the Tier 2 standards and described in detail in section IV.B.4.b.ii. of this preamble. These schedules provide manufacturers with greater flexibility and we believe they also provide incentive for manufacturers to introduce advanced emission control technology at an earlier date. Alternative phase-in schedules will have to provide 100% phase-in by the same year as the primary phase-in schedule (2007). Manufacturers will be eligible for alternate phase-in schedules to the extent that they produce HLDTs that meet or surpass the NO_X average standard for interim HLDTs of 0.20 g/mi in 2001–2003 or to the extent that they produce more HLDTs than required that meet the 0.20 average standard in 2004 or later.

Where manufacturers elect not to meet the phase-in requirements for all of their 2004 model year HLDTs, as discussed above under Option 2, they may still employ alternate phase-in schedules, but the sum of 225 percent is required rather than the 250 percent required for alternate phase-ins described in section IV.B.4.b.ii. In this case, the sum of phase-in percentages up through the 2005 model year must total to at least 50%. Also, manufacturers must raise the 225% value to the extent that any of their 2004 HLDTs' model years commence on or after the fourth anniversary of the signature date of this rule and are brought into compliance with the 0.20 g/mi average NO_X standard.

Lastly, note that for bin 10, which is only usable during the interim program, we have established a PM standard of 0.08 g/mi, which is more stringent than the Tier 1 standard previously in effect for these vehicles. We do not expect low sulfur diesel fuel to be widely available during the time frame of the interim program but we expect that bin 10 levels can be reached by diesel technology on current diesel fuel. As a part of this overall approach, we are making the intermediate life standards optional for diesels for this bin.

f. Light-Duty Evaporative Emission Standards

We are finalizing as proposed a set of more stringent evaporative emission standards for all Tier 2 light-duty vehicles and light-duty trucks. The standards we are finalizing are shown in Table IV.B.–9 and represent, for most vehicles, more than a 50% reduction in diurnal plus hot soak standards from those that will be in effect in the years immediately preceding Tier 2 implementation. The higher standards for HLDTs provide allowance for greater non-fuel emissions related to larger vehicle size.

TABLE IV.B.–9.—FINAL EVAPORATIVE EMISSION STANDARDS

[Grams per test]

Vehicle class	3 day diurnal +hot soak	Supplemental 2 day diurnal +hot soak
LDVs and LLDTs	0.95	1.2
HLDTs	1.2	1.5

Evaporative emissions from LDVs and LDTs represent nearly half of the light duty VOC inventory projected for the 2007–2010 time frame, according to MOBILE5 projections. Manufacturers are currently certifying to levels that are, on average, about half of the current standards, and in many cases, much less than half the standards. Thus, meeting these standards appears readily feasible. Even though manufacturers are already certifying at levels much below the current standard, we believe that reducing the standards will result in emission reductions as all manufacturers seek to certify with adequate margins to allow for in-use deterioration. Further, we believe that tighter standards will prevent ‘‘backsliding’’ toward the current standards as manufacturers pursue cost reductions.

As mentioned in section IV.B.–4.b above, we will phase in the Tier 2 evaporative standards by the same mechanism as the Tier 2 exhaust standards; *e.g.,* 25/50/75/100 percent beginning in 2004 for LDV/LLDTs and 50/100 percent beginning in 2008 for HLDTs (as shown in Table IV.B.–2). As for the exhaust standards, alternative phase-in plans will also be available.

The evaporative emission standards we proposed and are finalizing today are the same as those that manufacturers' associations proposed during the development of California's LEV II proposal. California ultimately opted for more stringent standards; we believe that our standards are appropriate for federal vehicles certified on higher-volatility federal test fuel.

g. Passenger Vehicles Above 8,500 Pounds GVWR

Historically, we have categorized all vehicles above 8,500 pounds GVWR as heavy-duty vehicles regardless of their application and they have been subject to standards and test procedures designed for vehicles used in heavier work applications. [71] In the Tier 2 NPRM, we requested comment on whether some portion of vehicles above 8,500 pounds GVWR should be included in the Tier 2 program, based on vehicle use or design characteristics. The Tier 2 proposals, however, applied to light-duty vehicles and light-duty trucks and did not cover any vehicles above 8,500 pounds GVWR.

On October 29, 1999, after carefully considering all of the comments on this issue, we proposed to include all personal use passenger vehicles (both gasoline and diesel fueled) between 8,500 and 10,000 pounds GVWR in the Tier 2 program. This group of vehicles would include large SUVs and passenger vans and may include other types of ‘‘crossover’’ multipurpose vehicles in the future, depending on new vehicle designs. We proposed this Tier 2 program change in our NPRM concerning emissions standards for 2004 and later heavy-duty vehicles and engines, (64 FR 58472).

Specifically, we proposed to revise the definition of light-duty truck to include any complete vehicle between 8,500 and 10,000 pounds GVWR that is designed primarily for the transportation of persons and has a capacity of not more than 12 persons. We expected that this definition would exclude vehicles that have been designed for a legitimate work function as their primary use, such as the largest pick-up trucks, the largest passenger vans, and cargo vans; these vehicles would continue to be categorized as heavy-duty and would be subject to applicable heavy-duty standards. We requested comment on whether the proposed definition would adequately exclude these vehicles, or whether additional criteria may be needed and how that criteria might be used.

Today, we are finalizing Tier 2 standards for passenger vehicles above 8,500 pounds GVWR. These vehicles are included in the Tier 2 program beginning in 2004 and are required to meet the final Tier 2 standards in 2009 and later. As we intended in the proposal, these vehicles will generally be subject to the same requirements as HLDTs. We have made modifications to the program, primarily in response to comments we received in two areas: (1) Changing the definition of light-duty truck and (2) the interim program requirements.

New Vehicle Category: Medium-Duty Passenger Vehicles (MDPVs)

The mechanism we proposed to bring the passenger vehicles over 8,500 pounds into the Tier 2 program, was to modify the definition of light-duty truck to include those vehicles. The objective of this proposal was to have these vehicles treated as HLDTs within Tier 2. We are finalizing requirements which remain consistent with our objective of including these vehicles in Tier 2 beginning in 2004. However, the approach we are finalizing is somewhat different than that proposed.

Rather than finalizing the revised definitions for light-duty truck as we proposed, we are creating a new category of heavy-duty vehicles termed ‘‘medium-duty passenger vehicles’’ (MDPVs). These vehicles will generally be grouped with and treated as HLDTs in the Tier 2 program. The MDPV category is defined along the lines of the proposed definition change for the LDT category, with some modification, as described below. Our decision to create a new sub-category of heavy-duty vehicles rather than modify the existing LDT definition does not, in and of itself, change the way in which Tier 2 standards are applied to the vehicles.

We decided upon the above approach because section 216 of the CAA establishes the definition for LDT as having the meaning contained in the CFR as of 1990. We received several comments that EPA may not change the definition and must instead devise a way to categorize the vehicles for purposes of Tier 2 which does not change the definition of light-duty truck. Rather than adopt a change to the LDT definition that would be questionable from a legal perspective, we are adopting an approach that we believe is clearly legally acceptable. Under this approach (as with the proposed approach), the standards for these vehicles are promulgated under

[71] The heavy-duty definition also includes vehicles that weigh over 6000 lbs curb weight regardless of their GVWR. We are not aware that any vehicles currently produced have curb weights above 6,000 lbs, but GVWRs of 8,500 lbs or less. Nevertheless, this discussion and our requirements includes such vehicles.

section 202(a)(3), which applies to heavy-duty vehicles/engines.

We are defining medium-duty passenger vehicles as any complete heavy duty vehicle less than10,000 pounds GVWR designed primarily for the transportation of persons including conversion vans (*i.e.,* vans which are intended to be converted to vans primarily intended for the transportation of persons. The conversion from cargo to passenger use usually includes the installation of rear seating, windows, carpet, and other amenities). We are not including any vehicle that (1) has a capacity of more than 12 persons total or, (2) that is designed to accommodate more than 9 persons in seating rearward of the driver's seat or, (3) has a cargo box (*e.g.,* a pick-up box or bed) of six feet or more in interior length. We would consider vehicles designed primarily for passenger use to be those that have seating available behind the driver's seat. We have added the rear passenger seating capacity criterion to exclude large passenger vehicles which are primarily used in heavy-load passenger applications. We do not believe vehicles designed primarily for personal use passenger transportation would be equipped with rear seating for more than 9 passengers. [72]

We have added the pick-up bed length criterion to the definition to clearly distinguish standard pick-ups from other vehicles meeting the GVWR and seating capacity criteria. We received several comments that although the proposal clearly states our intention not to include heavy-duty pick-up trucks in the Tier 2 program, the proposed regulatory definition was unclear. Currently, heavy-duty pick-ups have beds in excess of six feet. Any future offerings of vehicles that are equipped with significantly shorter beds would be included in the MDPV category, if the vehicle also met the weight and seating capacity criteria. EPA is making a distinction based on bed length because a vehicle introduced with a shorter bed would have reduced cargo capacity and would likely have increased seating capacity relative to current pick-ups, making it more likely to be used primarily as a passenger vehicle.

Interim Standards

As noted above, the MDPVs and HLDTs must meet the final Tier 2 standards by 2009 at the latest. Prior to 2009, HLDTs and MDPVs are required to meet interim standards. The interim standards, as described earlier in section IV.B.4, are based on a corporate average full life NO_X standard of 0.20 g/mile which is phased in 25/50/75/100 percent in 2004–2007. MDPVs must be grouped with HLDTs for the interim standards phase-in.

We received several comments from manufacturers that requiring these larger vehicles to meet a new, unique standard prior to phase-in to the interim program would worsen the workload burden created by the Tier 2 program. Manufacturers do not currently have facilities available for chassis-testing diesel vehicles and there is not enough time to fold diesel vehicles into a chassis-based program by 2004.[73]

To address this situation, we are providing the following temporary additional flexibilities for MDPVs. We are finalizing an additional upper bin for MDPVs for the interim program (effective in model years 2004 through 2008). This bin would only be available for MDPVs. The bin, shown in Table IV.B–10, is equivalent to the California LEV I standards that are applicable to these vehicles prior to 2004. Vehicles certified to this bin must be tested at adjusted loaded vehicle weight (ALVW), consistent with California program testing requirements.[74] Including this upper bin provides manufacturers with the ability to carry over their California vehicles to the federal program prior to their phase-in to the interim and final Tier 2 standards. Once phased in to the interim standards manufacturers may continue to use the upper bin but the vehicles must be included in the 0.20 g/mi NO_X average. The upper bin is not available to manufacturers for the final Tier 2 program.

TABLE IV.B.–10.—TEMPORARY INTERIM EXHAUST EMISSION STANDARDS BIN FOR MDPVS [a]

	NO_X	NMOG	CO	HCHO	PM
Full Useful Life (120,000 mile)	0.9	0.280	7.3	0.032	0.12

Notes:
[a] Bin expires after model year 2008.

We proposed that HLDTs not needed to meet the phase-in percentages for the interim program during model years 2004—2006 would be required to meet one of the interim bins. Such vehicles, however, would not be included in the calculation to demonstrate compliance with the 0.20 g/mile average. Thus, we proposed that the emissions of all interim HLDTs would be capped at a NO_X value of 0.6 g/mile. We are retaining the bin structure and requirements which effectively cap NO_X emissions at 0.6 g/mile for all HLDTs below 8,500 pounds GVWR, as described in section IV.B. Similarly, for MDPVs, the 0.9 g bin described above is the highest bin available and acts as the cap for vehicles not yet phased-in to the interim standards.

In addition, for diesel MDPVs prior to 2008, we are allowing manufacturers the option of meeting the heavy-duty engine standards in place for the coinciding model year. Diesels meeting the engine-based standards would be excluded from the interim program averaging pool. In 2008, the manufacturers must chassis certify diesel vehicles and include them either in the interim program or in the final Tier 2 program. In 2009 and later, all MDPVs, including diesels, must be brought into the final Tier 2 program. As with the higher bin of chassis-based standards, the purpose of this diesel provision is to provide the option of carry-over of vehicles until they are brought into the Tier 2 program. We believe these modifications to the program will substantially ease the workload concerns of manufacturers in the interim years by allowing them to carry-over vehicle models and engine families. The provisions also remain consistent with EPA's goal of including the vehicles in the overall Tier 2 program structure.

[72] Vehicles that are "designed" to accommodate more than nine passengers in the rearward seating area in their standard configuration but that have some of the standard rear seating removed to accommodate two or more wheel chair tie downs would usually not be considered MDPVs.

[73] Currently, diesel heavy-duty engines are certified to heavy-duty engine standards rather than vehicle standards.

[74] ALVW is the average of curb weight and GVWR. The test weight is sometimes refered to as "half payload".

For diesel engines that are engine certified and used in MDPVs, as allowed through model year 2007, we are requiring those engines to comprise a separate averaging set under the averaging, banking and trading requirements applicable to heavy-duty diesel engines. We are permitting engine-based certification for these diesel vehicles to provide time and flexibility for manufacturers who may have limited experience with chassis certifying vehicles containing such engines. However, we do not want to create a situation where engines above applicable engine standards could be used in these vehicles, when other MDPVs are being brought under stringent standards. Therefore we believe it is appropriate to constrain the application of credits to these engines. We note that we are not permitting credits from other programs (like NLEV) to be applied in any way to Tier 2 or interim vehicles.

For LDT4s, we have finalized an optional higher NMOG level of 0.280 g/mile for bin 10 (0.6 g/mile NO_X), as described in section IV.B.4.a of the preamble. MDPVs placed in bin 10 may also certify to the higher NMOG level of 0.280 g/mile. This provision provides manufacturers with the incentive of selecting the lower NO_X bin for MDPVs, since the NMOG level is not an obstacle to compliance.

As described in section IV. B.4.e.ii., manufacturers have two options for the start of the program requirements. In Option 1, the program begins with the 2004 model year for 25 percent all vehicles. In Option 2, manufacturers can exempt 2004 model year vehicle test groups whose model years begin on or after the fourth anniversary of this rule's signature. These options are also available for MDPVs for the same reasons we are providing them for HLDTs. However, the additional 0.9 g bin contained in Table IV.B.–10, the optional higher NMOG standard of 0.280 g/mile for bin 10, and the option of certifying to the engine-based standards for diesels are available only with Option 1.

Other Emission Control Requirements

We are requiring all non-diesel MDPVs to be OBDII compliant beginning in 2004. California requires OBDII for their LEV I program and therefore, the new OBDII requirements are consistent with the approach of allowing vehicles to be carried over from California. [75] Diesel vehicles which are carried over from the California program are required to be equipped with the OBD system as the system is certified in California. Diesel vehicles not carried over from California are not required as part of this rulemaking to be equipped with OBDII. However, we have proposed OBDII requirements for heavy-duty diesel engines in our heavy-duty engines NPRM (64 FR 58472). If OBDII requirements are finalized for heavy-duty engines and vehicles as part of that rulemaking the OBDII requirements would likewise apply to diesels in the MDPV category.

As proposed, we are applying Tier 2 evaporative emissions standards and existing HLDT ORVR requirements to MDPVs. MDPVs must be grouped with HLDTs for purposes of phasing in to the Tier 2 evaporative emission standards contained in this rule. We have added somewhat higher standards for the MDPVs to account for their larger fuel tanks and vehicle sizes.[76] However, the stringency of the standards remains similar to that for HLDTs. These standards are described in section IV.B.4.f of the preamble. ORVR requirements currently exist for HLDTs and are to be phased-in through model years 2004–2006.[77] We proposed to apply the same standards and phase-in requirements to vehicles over 8,500 pounds GVWR. We are finalizing these ORVR requirements for MDPVs, which must be grouped with HLDTs for purposes of phased-in to the ORVR requirements.

For those manufacturers electing option 2, OBD is required when the vehicle family is covered under these new requirements (*i.e.,* 2004 or 2005 depending on when certification occurs). For ORVR, the situation is similar. The phase-in is 40 percent of any 2004 certifications which occur four years after this rule is promulgated, 80 percent in 2005, and 100 percent in 2006. As before, the vehicles covered by these phase-ins must be combined with those in the LDT3/4 phase-in for purposes of calculating compliance.

We are finalizing Cold CO and Certification Short Test requirements for Tier 2 MDPVs. However, we are not finalizing SFTP standards for MDPVs in today's rulemaking. Currently, SFTP standards do not apply to any vehicles above 8,500 pounds GVWR, including those in the California LEV I and LEV II programs. We are concerned, therefore, that finalizing SFTP requirements in today's rulemaking would prevent manufacturers from carrying over vehicle models during the phase-in years of the program. We are currently contemplating a new SFTP rulemaking which would consider ''Tier 2'' SFTP standards for all vehicles, including MDPVs. California is also interested in developing more stringent SFTP standards within the context of their LEV II program and we are coordinating with California on these new SFTP standards.

Sustained Severe Use; In-Use Testing of MDPVs

While we are confident that MDPVs can comply in-use with the standards we are finalizing, manufacturers are concerned about in-use liability for MDPVs that are in sustained severe-use. In our in-use emission testing program, we generally screen vehicles for proper maintenance and use and delete vehicles that we believe may have been misused or malmaintained. Also, in the regulations for manufacturer in-use testing, we permit manufacturers to delete vehicles from samples if they have been used for ''severe duty (trailer towing for passenger cars, snow plowing, racing)'', and we provide that vehicles may be deleted for other reasons upon EPA approval.

We recognize that MDPVs will be marketed and used for carrying many passengers, carrying heavy loads and trailer towing. While it is not our intention to exempt vehicles from in-use liability that have been used for their intended purposes, we understand that some MDPVs may be subject to sustained severe service applications, such as frequent overloading or frequent towing beyond manufacturer's advertised capacity and could not be considered to be representative of properly maintained and used vehicles. Furthermore, we would not necessarily consider to be representative MDPVs which are routinely or regularly used in heavy-load hauling application or towing even within the manufacturers limits. Thus, for example, an SUV MDPV used on a daily basis to haul a work crew and tow equipment to a distant work site may not be representative while the same SUV used to haul the family and tow a boat to the lake on weekend excursions would be representative. MDPVs in sustained severe operations should not be included in manufacturer or EPA in-use test programs, while those that see less frequent severe operation should be included.

[75] As with HLDTs, the California OBDII compliance option is available for MDPVs.

[76] For Tier 2 MDPVs, evaporative standards will be 1.4 g/test for the 3 day diurnal+hot soak test and 1.75 g/test for the supplemental 2 day diurnal+hot soak test.

[77] ORVR requirements are phased in for HLDTs, at 40/80/100 percent in 2004–2006 (see 40 CFR 86.1810–01 (k)).

C. Our Program for Controlling Gasoline Sulfur

As with our program for vehicles, the program we are establishing today for reducing sulfur levels in commercial gasoline will achieve the same large NO_X reductions that we projected for the proposed program. Here, too, the final program is very similar to our proposed program. Adjustments we have made to the proposed program will smooth the refining industry's transition to the low-sulfur requirements and encourage earlier introduction of cleaner fuel.

With today's action, we are requiring substantial reductions in gasoline sulfur levels nationwide. As we explained in Section IV.A, because sulfur significantly inhibits the ability of automotive catalysts to control emissions, we had to consider sulfur's impact in setting the Tier 2 standards. We knew at the time of proposal that newer catalysts were more sensitive to sulfur than older technologies, and projected that Tier 2 catalysts would be as or even more sensitive than those used in today's NLEV vehicles. Furthermore, we believed that the sulfur build-up on Tier 2 catalysts may be irreversible. Since the proposal, additional data we've collected have confirmed and strengthened our concerns. It now appears that the catalysts expected to be used in Tier 2 vehicles will be even more sensitive to sulfur than we originally estimated, and that this sulfur impact will be approximately 45 percent irreversible under typical driving conditions. Thus, the gasoline sulfur standards we finalize today will enable the stringent tailpipe emission standards we're implementing for Tier 2 vehicles and will help to ensure that these low emission levels will be realized throughout the life of the vehicle. Furthermore, since vehicles already on the road, including NLEV vehicles, are in many cases quite sensitive to sulfur, gasoline sulfur control will also help to reduce emissions of pollutants that endanger public health and welfare from these vehicles.

In developing this gasoline sulfur control program, we gave substantial consideration to the ability of the refining industry to meet these requirements. We proposed a set of standards applying to refiners and to individual refineries combined with a sulfur averaging, banking, and trading (ABT) program intended to provide flexibility in meeting the standards. We concluded that our proposal was reasonable and cost-effective based on our projections regarding the number of refineries that would (1) need to reduce sulfur levels each year as the standards tightened, (2) need sulfur ABT credits to meet the 30 ppm refinery average standard in 2004 and/or 2005 to defer installation of desulfurization equipment, and (3) install desulfurization equipment prior to 2004, generating the needed sulfur credits. This analysis formed our picture of the industry's investment stream—a year-by-year estimate of how many refineries would be constructing new equipment and what technologies these refineries would choose. We assumed that any investments would be in the new, lower cost technologies, and that these technologies would be available and adequately demonstrated to allow refiners to select them as early as the year 2000 to begin operation (and thus, credit generation) as early as 2002. Based on these assumptions, our analysis showed that sufficient credits would be generated before 2004 to enable a number of refineries to delay construction and use credits to meet the 30 ppm standard in 2004, and in some cases, even in 2005. Overall, we believed our analysis represented a reasonable and balanced rate of investment by the industry over a several year time period.

In response to our proposal, we received many comments which raised concerns about the feasibility of our program. Some comments suggested that our proposed declining cap (300 ppm cap for 2004 and a reduced cap of 180 ppm for 2005) could be an additional and burdensome expense for most refiners to meet. Specifically, these commenters believed that the declining cap would be more constraining than compliance with the corporate average or even the refinery average standards (as long as the ABT program produced sufficient credits). Because refiners probably would not make multiple investments in such a short time, the 180 ppm cap could force some refiners to install the equipment needed to get to the 80 ppm cap earlier than otherwise needed. The commenters argued that this would force all of the industry's investments into the first years of the program rather than allowing for a smoother transition over several years as we had originally envisioned. Many comments also suggested that since there have not been long-term commercial demonstrations of the newer gasoline desulfurization technologies, refiners would not consider these technologies to be viable and, if faced with our proposed 30 ppm standard in 2004, may select the more traditional, higher cost sulfur reduction processes. Some of these commenters suggested that we should delay the 30 ppm standard, and recommended a range of suggested deadlines (2005–2007).

We also received many comments which suggested that the ABT program restricted the generation of credits, and provided no certainty that credits would be generated prior to 2004. Commenters stated that two features in particular—the delay in establishing each refinery's sulfur baseline due to 1997–98 data review and the strict 150 ppm ''trigger'' for generating credits—caused them to question whether adequate sulfur credits would be available. If credits could not be guaranteed early enough to forestall investment decisions, refiners would be forced to begin construction earlier than we had projected. Under such a scenario, the costs of the program would be substantially greater, and many commenters suggested that, regardless of cost, it would be impossible for the entire industry to meet the deadline (due to limitations on engineering design and construction resources as well as the time required to obtain permits).

Finally, we received many comments which argued that not all refineries would be able to concurrently comply with the proposed standards in the time period provided, given the competition for engineering resources and the time needed for construction of desulfurization equipment. These comments focused specifically on small refineries (owned by both small and large corporations) and refineries that were relatively isolated geographically (such as many refineries in the Rocky Mountain region) which had little access to other sources of gasoline should they have difficulty in complying with our requirements. The commenters generally argued that these refiners needed more time than the rest of the industry to meet our proposed standards. Some of the commenters also argued that the standards applicable to many of these refiners should be less stringent because of their belief that the environmental needs of the states where these refineries were located and/or marketed gasoline were small relative to the needs of other states. Suggestions for temporary and permanent regional programs which provided less stringent control in the Western half of the country were included with many of these comments.

Based on what we've learned from the comments received and additional information we've gathered, we have revised our analysis of when refiners will invest in desulfurization equipment and how the sulfur ABT program can best help to distribute these investments over several years while maintaining the original goals of the program. The following is a brief summary of our new analysis; a more complete explanation of our assumptions can be found in the RIA.

About 15 percent of current domestic gasoline production already meets the gasoline sulfur standard, or can do so with very little additional capital investment, and at most a small increase in operating cost. The remainder of the industry—the majority of U.S. refineries—will have to install at least one desulfurization processing unit to lower gasoline sulfur to the required levels. Furthermore, many of these refineries will need to make changes to their operations in advance of 2004 simply to comply with the 300 ppm cap standard, even if they can obtain sufficient ABT credits to delay compliance with the 30 ppm refinery average standard. Refiners facing this situation will need to make their decisions within a year or at most two from today's action. From the comments we received and discussions we've had with refiners and technology vendors, we acknowledge that some of the newer, more promising processes may not be in operation for sufficient time to gain valuable operating experience (one to two years of operation) until 2002 or later. Hence, we now believe that some refiners may choose from one of the traditional, commercially-demonstrated desulfurization processes, even though these technologies may be more costly, to meet our standards.

However, we continue to believe that the majority of refiners will delay construction (taking advantage of the sulfur ABT program and perhaps making modest operational changes in the interim) and will have a wide range of technological options to choose from, at reduced capital investment and operating costs compared to the more traditional approaches. Examples of these technologies are CDHydro and CDHDS (licensed by the company CDTECH), Octgain 125 and Octgain 220 (licensed by Mobil Oil), S Zorb (licensed by Phillips), IRVAD (licensed by Black & Veatch), and others. These technologies generally use conventional refining processes combined in new ways, with improved catalysts and other design changes that minimize the undesirable impacts (such as a substantial loss in octane) and maximize the effectiveness of the desulfurization approach. Since these processes provide less costly ways to reduce gasoline sulfur, we have based our economic assessment (summarized in Section IV.D. below) on the presumption that the majority of refiners will elect to use one of these processes to meet the 30 ppm standard, even if it requires delaying compliance (through the purchase of ABT program credits) until 2006.

However, after considering the data available to us about current refinery sulfur levels and the ability of refiners to reduce sulfur levels to meet the standards, we have made several modest changes to the program. These changes will not affect the environmental performance of the proposed program. We agree that the declining cap had the unintended consequence of forcing investments earlier than desired for an orderly transition to the 80 ppm cap. Thus, we have changed the program from the proposal, establishing a 300 ppm per-gallon cap in 2004 and 2005. We do not expect this change to have an impact on the environment (or on the Tier 2 vehicles that will be introduced in this interim period) since average sulfur levels will be required to decrease due to the declining corporate average, which begins in 2004. We kept the corporate average standards proposed for 2004 and 2005, but are permitting inter-company trading around these standards. We believe this change will provide further flexibility to the industry in allowing some refineries to delay construction and encourage others to move forward sooner. Having now concluded that many refiners would benefit from an additional year to evaluate and consider the technological options before having to install equipment to meet the 30 ppm standard, we have delayed this standard for one year. In acknowledgment that some areas of the country have less urgent environmental needs for the emissions reductions that this program will bring, and that many of the refiners that supply gasoline to these areas are ones which will have the most difficulty in meeting the standards, we have finalized a geographic phase-in of the standards to complement the temporal phase-in applicable to the rest of the industry. Thus, in certain states in the West, refiners have the option of meeting interim standards while delaying compliance with the 30 ppm average until 2007. Finally, we have made changes to the sulfur baseline requirements and the credit trigger to help ensure that the sulfur ABT program functions as we originally envisioned it would.

These changes will encourage reductions in gasoline sulfur levels beginning as early as 2000, while providing enough flexibility to require the majority of refineries to meet a 30 ppm average sulfur standard by 2006. Overall, the industry will be able to spread the needed investments over several years rather than having to comply as a whole by 2004, and will be able to maximize the use of the most efficient and lowest cost technologies. While we have provided additional flexibility for the industry, we have done so without compromising the environmental benefits of the program in 2004 and beyond when compared to our proposal.

The following sections summarize the requirements for gasoline refiners and importers, including our geographic phase-in requirements; special provisions for small refiners, and our plans to facilitate the construction permitting process to enable refiners to install gasoline desulfurization technology in a timely manner. Section VI provides additional information about the compliance and enforcement provisions that will accompany these requirements. More detailed information in support of the conclusions presented here is found in the RIA and in our RTC document.

1. Gasoline Sulfur Standards for Refiners and Importers

This section explains who must comply with the gasoline sulfur control requirements, the standards and deadlines for compliance, and how refiners can use the ABT program to meet the standards. The last section discusses how individual state gasoline sulfur programs are affected by today's action. Standards specific to eligible small refiners are presented in Section IV.C.2.

a. Standards and Deadlines that Refiners/Importers Must Meet

Anyone who produces gasoline for sale in the U.S. must comply with these regulations. This includes anyone meeting our definition of a refiner (including blenders, in most instances) and importers. Certain refiners may qualify for temporarily less stringent standards and deadlines because these companies either (1) market gasoline in the temporary geographic phase-in area (explained in section b below), or (2) they qualify under our definition of small refiner (explained in section IV.C.2 below). Foreign refiners may also have separate requirements, if they qualify as small refiners.

These requirements will apply to all gasoline sold in the U.S., including Alaska, Hawaii, Puerto Rico, American Samoa, the Virgin Islands, Guam, and the Northern Mariana Islands.[78] This national approach is appropriate, based on our conclusions that vehicle emissions must be reduced nationwide to adequately protect public health and the environment and Tier 2 vehicles require protection from the harmful impacts of gasoline sulfur regardless of where they are operated.

Table IV.C.–1. summarizes the standards for gasoline refiners and importers. There are three standards which refiners and importers must meet. In 2004 and beyond, every gallon of gasoline produced is limited by a per-gallon maximum or ''cap.'' The cap standard becomes effective January 1, 2004 (and January 1 of subsequent years as the cap standard changes). Also, in 2004 and 2005, each refiner must meet an annual-average standard for its entire corporate gasoline pool. Finally, each individual refinery is subject to a refinery average standard, beginning in 2005. Refineries that do not take advantage of the sulfur ABT program will have actual sulfur levels averaging 30 ppm beginning in 2005. Additional details about the requirements for meeting these standards is found in the following sections.

TABLE IV.C.–1.—GASOLINE SULFUR STANDARDS FOR REFINERS, IMPORTERS, AND INDIVIDUAL REFINERIES

[Excluding Small Refiners and GPA Gasoline]

Compliance as of—	2004 [a]	2005	2006+
Refinery Average, ppm [b]	....	30	30
Corporate Pool Average, ppm [c]	120	90	....
Per-Gallon Cap,[d] ppm	300	300	80

NOTES:

[a] We project that the pool averages will actually be below 120 ppm in 2004. For a discussion of how the program gets early sulfur reductions before 2004, see section IV.C.1.c.

[b] The refinery average standard can be met through the use of sulfur credits or allotments from the sulfur ABT program, as long as the applicable corporate pool average and per-gallon caps are not exceeded, as explained in Section IV.C.1.c.viii.

[c] The corporate pool average standard can be met through the use of corporate allotments obtained from other refiners, if necessary, as explained in Section IV.C.1.c.iii.

[d] In 2004, exceedances up to 50 ppm beyond the 300 ppm cap are allowed. However, in 2005, the cap for all batches will be reduced by the magnitude of the exceedance.

i. What Are the Per-Gallon Caps on Gasoline Sulfur Levels in 2004 and Beyond?

To reduce the potential for permanent damage to the emission controls of Tier 2 vehicles and later NLEV vehicles, we are implementing caps on the sulfur content of every batch of gasoline produced or imported into the country beginning in 2004. As shown in Table IV.C.–1, a cap of 300 ppm is first implemented in 2004. This cap remains in 2005. In 2006 and beyond, the cap is lowered to 80 ppm. These caps apply at the refinery gate. Sulfur caps are also applied to gasoline downstream of the refinery; see Section VI for additional discussion of downstream cap standards. These downstream caps will facilitate compliance and enforcement without changing the way the distribution system currently functions.

Several commenters suggested the rule should also include a provision to address the occasions when refiners must temporarily take processing units out of operation so that planned, recurring maintenance can be performed, commonly termed ''turnarounds,'' or if processing units are unexpectedly taken out of operation due to accident or malfunction, commonly termed ''upsets.'' These commenters expressed particular concern that the gasoline produced at a refinery may not meet the sulfur cap standards when a refinery's desulfurization unit is not operating. These commenters contended that the regulations should allow refiners to produce gasoline that exceeds the cap standard for a limited time where the excess sulfur is due to a turnaround or upset. However, they also suggested that the refiner should be required to meet the refinery average standard with the high sulfur gasoline included in its average calculation in order to create an incentive for refiners to limit the volume and sulfur content of high sulfur gasoline.

Today's rule does not grant relief to refiners because of turnarounds or upsets. While the concern raised by the commenters is reasonable, the solution they suggested would nevertheless result in distribution of gasoline exceeding the cap standards. The cap standards are necessary because gasoline with higher sulfur levels will significantly harm or destroy the emission controls used in Tier 2 vehicles.

We believe there are strategies refiners can use to mitigate or eliminate the difficulties associated with turnarounds and upsets. For example, some refiners schedule turnarounds for a number of refinery processing units at the same time when the refinery largely stops producing gasoline, thereby avoiding the need to produce any high sulfur gasoline. In other situations it may be possible for a refiner to store high sulfur products until the desulfurization unit is operating or to transfer high sulfur products to a neighboring refinery for desulfurization.

We commit to continue evaluating the turnaround issue especially as new technologies are introduced. Based on our evaluation, if a problem is evident and if an appropriate solution can be devised, we will act at that time.

In 2004, if any batch of gasoline[79] exceeds the 300 ppm cap (up to 350 ppm), then the cap for all batches produced by the refinery in 2005 will be reduced by the magnitude of the exceedance. For example, if any given batch of gasoline has a cap of 325 ppm (a 25 ppm exceedance) in 2004, then the cap becomes 275 ppm for all batches of gasoline produced by that refinery in 2005. However, at no time in 2004 can a batch be higher than 350 ppm sulfur. We have made this adjustment to accommodate those refiners who would have to invest in control technologies to meet the 300 ppm cap in 2004 (perhaps at a higher cost than they would incur if they could delay the investment a year) but could otherwise meet a slightly higher cap through operational changes which would not require new equipment.

[78] Gasoline sold in California is exempt from meeting these Federal standards, due to our belief that California gasoline already meets or exceeds these requirements. See Section VI for more discussion on this issue.

[79] Including gasoline produced for use in the geographic phase-in area and small refiner gasoline.

ii. What Standards Must Refiners/Importers Meet on a Corporate Average Basis?

Refiners and importers must meet annual-average, volume-weighted sulfur standards for their entire corporate gasoline pool in 2004 and 2005. In 2004, this standard is 120 ppm; in 2005, it is reduced to 90 ppm. In 2006 and beyond, there will no longer be a corporate pool average standard, since each refinery and importer will be held to its own single refinery average standard, as discussed in the next section.

These standards represent the maximum allowable sulfur levels, on an annual average basis, for each refiner/importer, volume-weighted across all refineries owned and operated by that refiner (or all gasoline imported by the importer in the calendar year), rather than at each individual refinery or by each batch of gasoline. Thus, a refiner's gasoline may exceed the average standard of 120 ppm at one refinery, if sufficient gasoline below that standard is produced at its other refinery(ies), such that its corporate, volume-weighted average sulfur level does not exceed 120 ppm. Alternatively, allotments may be used to meet this requirement. This requirement does not apply to small entities or to corporations that do not have to meet the pool average standard in the GPA program. For compliance with this corporate averaging requirement, as well as with the other requirements of this subpart, we consider a parent corporation owning wholly-owned subsidiaries that also own refineries to be the refiner of these facilities. Thus, the parent corporation must comply with refiner corporate average requirements. In its compliance calculations, the refiner must include the gasoline produced at the refineries it owns, plus the gasoline produced at the refineries owned by its wholly-owned subsidiaries.

For purposes of compliance, we proposed that a joint venture, in which two or more refiners collectively own and operate one or more refineries, be treated as a separate refining corporation under the gasoline sulfur requirements. Hence, a refinery owned by a joint venture would have been included in the corporate pool calculations of the joint venture, and could not have been included in calculations with other refineries solely owned by one of the parties to the joint venture. Based on comments we received on this issue which argued that a company with majority ownership in the joint venture should be allowed to count the jointly held refinery in its corporate average, we have revised our treatment of refineries owned by joint ventures. Each joint venture must separately meet the corporate pool average standard, whether the joint venture owns one or multiple refineries. If a joint venture fails to meet the corporate pool average standard, then each partner in the joint venture is jointly and severally liable for the violation. However, if one partner to a joint venture refinery includes the joint venture refinery in its corporate pool, and that corporate pool meets the corporate pool average standard, then the joint venture will be considered by EPA to be in compliance (if the joint venture owns only the one refinery). If the joint venture owns multiple refineries and only one or some of the refineries is included in the corporate pool calculations of one partner, compliance by the joint venture with the corporate pool average standard will be judged based on the average sulfur levels of the remaining refinery(ies) owned by the joint venture.

In meeting the corporate average stds in 2004 and 2005, refiners and importers may use allotments as discussed in IV.C.1.c below.

iii. What Standards Must be Met by Individual Refineries/Importers?

Beginning in 2005, every refinery must meet an average standard of 30 ppm sulfur at the refinery gate on an annual, volume-weighted basis. Similarly, every importer must meet the 30 ppm average standard beginning in 2005. (These requirements do not apply to small entities or to GPA gasoline). In meeting this standard, individual refineries and importers may use credits generated or purchased under the provisions of the sulfur ABT program discussed below in Section IV.C.1.c, and/or, in 2005 (only), sulfur allotments (as described in the previous section) obtained from a refiner who has excess allotments to sell, if they are unable to comply based on their actual gasoline sulfur levels. Hence, the actual average sulfur levels for gasoline produced at some refineries can be higher than 30 ppm in 2005, but only if refiners use (1) credits generated from cleaner gasoline produced early and/or (2) allotments generated by a refiner which produces gasoline averaging, on a corporate basis, lower than 90 ppm in 2005. However, the corporate pool average standards and per-gallon caps will limit the degree to which gasoline can exceed 30 ppm on average.

We allow refiners to use either sulfur allotments or ABT credits to meet the 30 ppm standard in 2005 for several reasons. First, this is an environmentally neutral approach because the national pool in 2005 will still average no greater than 90 ppm, since every refiner must meet the corporate average standard before applying allotments to the compliance of any refineries with the 30 ppm standard. Second, it provides refiners who have excess allotments in 2005 an additional market for those allotments, thus giving refiners an incentive to exceed the 90 ppm corporate average standard in 2005. In either case, the reductions will have occurred and thus the allotments and credits have very similar purposes and thus should be interchangeable.

In 2006 and beyond, the 30 ppm refinery average standard continues to be a requirement for every refinery or importer. The sulfur credits generated in the ABT program may be used by refineries or importers to comply with this requirement. However, because of the 80 ppm cap in these years, we expect that the majority of refiners/importers will average 30 ppm, although some individual refineries/importers could average slightly more or less (if the refineries/importers bank, sell, or purchase credits to meet this standard, as explained in the ABT discussion below). Furthermore, the majority of credits will expire at the end of 2006.

b. Standards and Deadlines for Refiners/Importers Which Provide Gasoline to the Geographic Phase-In Area (GPA)

As indicated above, certain refiners may qualify for temporarily less stringent standards and deadlines for some or all of their gasoline because these companies either (1) produce gasoline to be sold in the temporary geographic phase-in area (GPA) or (2) qualify under our definition of small refiner. In this section, we explain the geographic phase-in area of our program and the interim standards and deadlines for compliance in that area. The provisions that apply to qualifying small refiners are described in section IV.C.2., below.

i. Justification for Our Geographic Phase-In Approach

In addition to phasing in our national gasoline sulfur program temporally from 2004–2006, we are phasing in our program geographically. In response to our proposal, we received many comments from the refining industry regarding timely implementation of our proposed gasoline sulfur program. Commenters argued that not all refineries would be able to concurrently comply with the proposed standards in the time period provided, given the competition for engineering resources and the time needed for construction of desulfurization equipment. In consideration of these comments, we have made some modifications to enhance the timing of our program without compromising the environmental benefits we expected from our proposal.

As part of our assessment we also examined other phase-in approaches which might enhance the orderly introduction of refining technology without jeopardizing the environmental benefits of our program. As a result of this assessment, we have concluded that many states in the Great Plains and Rocky Mountain areas of the United States have a somewhat less urgent environmental need for ozone precursor reductions in the near term. Moreover, their gasoline supply is dominated by that produced by small capacity, geographically-isolated refineries located therein. As a general rule, refineries in this area will have the most difficult time of all refineries nationwide in competing for the vendor, supply, engineering, and construction resources needed to modify their refineries to comply with the standards. Based on 1998 Department of Energy data, over 80 percent of the gasoline sold in this area is produced by the relatively small refineries located within the region.[80] Similarly, Alaska faces a less urgent environmental need for reductions in ozone precursors and has refineries which are challenged and geographically isolated.

A more orderly and cost-efficient phase-in of the 30 ppm standard could be achieved if all gasoline sold in this area was subject to somewhat less stringent standards than those in the rest of the country for a short time. This approach will allow the refineries producing gasoline for use in this area more compliance flexibility, more time to install and prove out the equipment needed for compliance, and thus a greater opportunity to reduce their overall costs. As described below, this approach results in only a minimal loss in emission reduction benefits. By stretching out demand for design, engineering, construction and other related services during the 2000–06 period, these provisions should also help to reduce the overall costs of the gasoline sulfur program.

The remainder of this section is divided into two parts. The first describes the rationale for development of this approach and how we identified the appropriate area, and the second provides a description of the requirements for refiners and importers that produce fuel for sale in the area.

ii. What Is the Geographic Phase-in Area (GPA) and How Was it Established?

As we considered the geographic phase-in approach, we aimed to minimize the environmental losses which could occur from exposing Tier 2, NLEV, (and other) vehicles to higher gasoline sulfur levels when the gasoline sulfur standards are being phased in nationwide. We used two criteria to develop and evaluate this approach: (1) relative environmental need and (2) the ability of U.S. refiners and the distribution system to provide compliant gasoline.

The states we have identified for the GPA are shown in Figure IV.C–1.[81]

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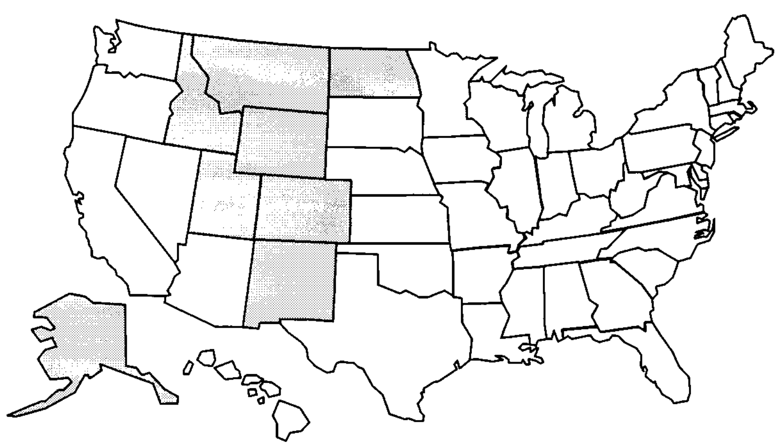
Figure IV.C.-1:

Geographic Phase-In Area (GPA)



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The first and primary criterion we considered in defining this area was environmental need. In defining the GPA, we identified those states that have somewhat less urgent environmental need in the near term for reductions in ozone precursors and whose emissions are less important in terms of ozone transport concerns. This area includes some states that are located in the Great Plains and the Rocky Mountains, as well as Alaska. Most states within the Rocky Mountains and Great Plains do not have a compliance problem with the 1-hour ozone standard in the near term, although they do have concerns in terms of maintaining compliance with the particulate matter standard. However, there are two states (Arizona and Nevada) in the Rocky Mountain vicinity that do have ozone air quality concerns. These states have instituted local fuel quality programs (in Phoenix, AZ and Las Vegas, NV) to reduce ozone precursor emissions. In addition, as shown in Table III.C–2, Arizona and Nevada are projected to have concerns with PM10 compliance in the future. Given these factors, we excluded them

[80] Much of this gasoline is produced by small volume refineries that are not owned by small businesses, and are therefore not afforded the flexibility of the small refiner provisions described in Section IV.C.2.

[81] Alaska, Colorado, Idaho, Montana, New Mexico, North Dakota, Utah, and Wyoming

from the phase-in area and its temporarily less stringent standards except as described below in Section IV.C.1.b.vii for counties and tribal lands in adjacent states.

We also defined the phase-in area based on the relative difficulty of producing or obtaining complying gasoline. The refining industry in the GPA is dominated by relatively low capacity, geographically-isolated refineries many of which are owned by independent companies. Such refineries face special challenges in complying with the requirements of the national program by 2004 because their crude capacity, corporate size, and location make it difficult for them to compete for the design, engineering, and construction resources needed to comply by 2004.

Furthermore, an assessment of 1998 gasoline production and use data and information on the products pipeline system shows that states in the GPA and portions of several adjoining states are solely or predominantly dependent on gasoline produced by these refineries and have limited or no access to gasoline from other parts of the country. Based on this analysis, we concluded that several states and portions of other states meeting our first criterion (less urgent environmental need for ozone precursor emission reductions) also face the likelihood of a supply shortage of low sulfur gasoline. Providing low sulfur gasoline to these states and adjoining areas is expected to be more difficult and costly in the near term. Section IV.C.1.b.vii below, discusses how the adjoining areas (counties/tribal lands) will be identified.

Thus, we believe it is appropriate to phase in the 30 ppm average, 80 ppm cap standards in these areas by allowing an additional year compared to the rest of the country, rather than delaying implementation of the standards nationwide to accommodate these states. Under this approach, the areas with the most urgent need for the ozone reduction benefits associated with low sulfur gasoline will realize them as soon as is feasible, and other areas will experience them shortly thereafter.

On the other hand, much of the area in the adjoining states has significant pipeline, rail, barge, and truck access to gasoline which will be capable of meeting the standards in Table IV.C–1 beginning in 2004. Even if these states have less environmental need in the near term, there are health benefits (particulate and air toxic emission reductions) as well as performance benefits for vehicle emission control systems (including avoidable irreversible sulfur effects) which need not be foregone. Therefore, we concluded that since it will not be more difficult to send gasoline to these adjoining areas through the distribution system, the significant environmental benefits of requiring low sulfur gasoline as early as is feasible justifies excluding these states from the GPA.

Some might argue that there are other states which should be considered under this program. However, based on our criteria of environmental need (including ozone transport and irreversibility concerns) challenged refineries, and limited access to complying gasoline we could identify no other states or territories which to include.

iii. Standards/Deadlines for Gasoline Sold in the Geographic Phase-in Area

While the states in the GPA may have less of an environmental need for ozone precursor reductions in the near term, there are significant environmental reasons to make the program as stringent as possible, still enabling a smooth transition to low sulfur gasoline nationwide. Toward that end, we are establishing the following requirements for gasoline sold in the GPA, which we view as the appropriate balance between these two factors.

The GPA provision covers all gasoline produced or imported for use in the GPA, whether refined there or brought in by pipeline, truck, rail, etc.[82] Foreign refiners are involved in this program through the importers, who are, in fact, the regulated entities. Refineries and importers must meet a 150 ppm average and a 300 ppm cap for all gasoline produced or imported for the GPA under this program beginning January 1, 2004. However, if a refinery's/importer's 1997–98 average sulfur level is less than 150 ppm, then that refinery's/importers gasoline has a standard of its baseline plus 30 ppm but in no case greater than 150 ppm. For example, a refinery with a baseline of 100 ppm would have a sulfur standard of 130 ppm for its GPA gasoline, a refinery with a baseline sulfur level of 140 ppm would have a standard of 150 ppm for its GPA gasoline, and a refinery with a baseline of 200 ppm would have a standard of 150 ppm for its GPA gasoline. Furthermore, if under the ABT provisions discussed below and in section IV.C.1.c, a refinery/importer generates credits (in 2000–2003) and/or allotments (in 2003) by dropping its refinery/imported gasoline average below 150 ppm then the baseline for that refinery is set at the new level and the standard becomes baseline plus 30 ppm but not greater than 150 ppm. This is to ensure that refineries and importers who already are lower than the 150 ppm standard on average maintain current sulfur levels. The 30 ppm factor is intended to allow some flexibility for refineries and importers whose 1997 and 1998 levels are an aberration from normal operations or who face changes in crude slates in future years.

Corporate pool average standards apply in the national gasoline sulfur program for calendar years 2004 and 2005. Most refiners/importers producing gasoline for use in the GPA market the majority of their gasoline outside of the GPA where they compete with many other refineries. Since the phase-in of the national program expects compliance with the 120/90 ppm corporate pool average standards in 2004 and 2005, we are requiring that refiners/importers who market the majority (greater than 50 percent of production volume) of their gasoline outside of the GPA to account for the sulfur levels of their GPA gasoline in their calculation for compliance with the corporate pool average standards.

To provide additional flexibility during this phase-in, refiners may use sulfur ABT credits and allotments (as explained in IV.C.1.c) to meet these standards. Refineries producing GPA gasoline can generate credits beginning in 2000 under the provisions of the national program (described in section IV.C.1.c). Also, refineries/importers marketing gasoline in the GPA may through extraordinary measures be able to generate credits in 2004–2006. To qualify they must achieve levels below 150 ppm or their more stringent baseline levels as discussed above whichever is less. Under these circumstances, these refineries/importers can earn credits for the GPA gasoline they produce during 2004–06. Credits generated under the GPA program are fully fungible with national credits and are subject to the same regulatory requirements.

The national program includes provisions which permit refiners/importers to generate allotments for use in 2004 and 2005. Refiners and importers marketing gasoline in the GPA may only generate sulfur allotments in 2004 or 2005 if their corporate average sulfur level meets the corporate pool average standards for each year (as indicated in Table IV.C.1), including gasoline produced for the GPA, if applicable. Refiners not compelled to meet the corporate pool

[82] As discussed below, refiners can supply gasoline not designated as GPA gasoline to the GPA, provided it meets the standards in Table IV.C.–2. Also, the GPA standards do not apply to gasoline produced by small refiners that is used in the GPA.

average standards under the GPA may not generate allotments.

The temporary provisions for the GPA apply for three years, 2004 through 2006. Since the low sulfur standards for the rest of the country require compliance with a 30 ppm refinery average standard and an 80 ppm gallon cap in 2006, the geographic phase-in provides an additional year to reach those standards. This extra year and the somewhat less stringent standards during the phase-in will provide the refining industry the opportunity for more orderly transition to the 30/80 ppm standards by 2007.

Requirements for gasoline sold in the GPA are summarized in Table IV.C.–2, below. Gasoline produced by refiners subject to the small refiner standards described in Section IV.C.2. of this notice is not subject to the provision of the geographic phase-in, since the small refiner provisions apply to eligible refiners regardless of geographic location. Gasoline produced by such refiners can be sold nationwide, including in the GPA.

TABLE IV.C.–2.—GASOLINE SULFUR STANDARDS FOR THE GEOGRAPHIC PHASE-IN AREA

[Excludes Small Refiners]

Compliance as of—	2004	2005	2006
Refinery GPA Gasoline Average [a], ppm	150	150	150.
Corporate Pool Average [b], ppm	120	90	Not Applicable.
Per-Gallon Cap [c], ppm	300	300	300.

Notes:

[a] The refinery average standard for GPA gasoline is the more stringent of: 150 ppm; the refinery 1997–1998 baseline plus 30 ppm; or the sulfur level from which early credits were generated plus 30 ppm. Refiners can use credits or allotments to meet the average.

[b] Applies only to refiners/importers which sell >50% of their gasoline outside the GPA.

[c] As discussed above, in 2004 both GPA and Non-GPA gasoline may have a sulfur content as high as 350 in which case the refinery or importer becomes subject to a correspondingly more stringent cap standard in 2005.

iv. What Are the Per-Gallon Caps on Gasoline Sulfur Levels in the Phase-in Area?

The sulfur level caps for gasoline sold in the phase-in area and the rest of the nation are the same in 2004 and 2005, but in 2006 the cap remains at 300 ppm in this area while it declines to 80 ppm for the rest of the country. To assure that compliance at the refinery gate is correct regardless of where the gasoline is ultimately sold, as gasoline intended for the GPA moves in the distribution system to or through the geographic area it must be identified as phase-in area gasoline in product transfer documents and must remain segregated from gasoline intended for use outside this area. In addition, use of phase-in area gasoline is prohibited outside the GPA, but the converse is allowed, i.e., gasoline designated for use outside the GPA can be used in this area. For all three years, refiners and importers must meet the requirements described in Tables IV–C.1 and IV–C.2, as applicable, and therefore must maintain refinery or import records as applicable as to where a gasoline batch is sold.[83]

We recognize that this higher standard/cap for one year could create the incentive for those not marketing gasoline in the GPA today to seek a market to sell higher sulfur gasoline and for others to seek to increase market share. While this is indeed allowable under our program and is perhaps to be anticipated in a free market system, in all likelihood the incentives are small. Such refiners/importers would still have to meet the 150 ppm average and would perhaps face increased shipping and marketing costs. Nonetheless, we plan to monitor market developments to assess whether such a provision creates significant market shifts or the potential for increases in average sulfur levels in the GPA gasoline.

v. How Do Refiners/Importers Account for GPA Fuel in Their Corporate Average Calculations?

Those refiners or importers that sell all of their gasoline to the GPA (*i.e.,* they produce no fuel for use outside the GPA), regardless of whether they are located within or outside of the area, have refinery/importer standards that are equal to the least of 1) 150 ppm, 2) the refinery's or importer's 1997–98 average sulfur level plus 30 ppm or 3) the refinery's or importer's lowest actual annual sulfur level plus 30 ppm in any year 2000–2003 if credits are generated. Because the refiners produce *all* of their fuel for use in the GPA, they are exempt from the corporate average standards in Table IV.C–1.

Furthermore, any refiner/importer which certifies 50 percent or more of its gasoline production volume for sale as GPA gasoline in 2004 and 2005 is not required to meet the corporate pool average for that year for its entire gasoline pool. Not only would it be difficult to comply on average (if it were assumed that the GPA gasoline was 150 ppm and non-GPA gasoline was 30 ppm), but also it would undermine the achievement of the basic goal of a more orderly and efficient phase-in of low sulfur gasoline since the flexibility afforded by the GPA could be diminished.

Otherwise, those who produce less than 50 percent of their gasoline for the GPA (which is the majority of those refiners which market in both locations), must meet the corporate pool average standards in 2004 and 2005 for their entire gasoline pool. Thus, such refiners must compensate for the higher sulfur levels of their GPA gasoline by producing non-GPA gasoline that averages sufficiently less than 120 ppm in 2004 and 90 ppm in 2005 to ensure that their corporate average meets the corporate pool average standard for each year. Importers who provide less than 50 percent of their gasoline to the GPA must also include their GPA gasoline in their overall corporate pool average calculation. Alternatively, the refiner can use sulfur allotments to meet the corporate pool average standard for its total gasoline production, including gasoline sold inside and outside the phase-in area. Since most refiners which sell gasoline both in and outside the GPA sell the vast majority outside the GPA the additional flexibility provided for gasoline sold in the phase-in area should not significantly affect compliance with the corporate pool average standard for a refiner's nationwide production.

vi. How Do Refiners/Importers Apply for the Geographic Phase-in Area Standards?

As part of program administration, we are requiring that any refiner/importer

[83] These segregation and designation requirements do not apply to gasoline produced by refiners subject to the small refiner standards described in Section IV.C.2. This is because small refiner gasoline can be sold anywhere in the country, and is not subject to different standards depending on where it is sold.

expecting to sell gasoline in this area during the phase-in period (2004–2006) make application to EPA in writing by December 31, 2000. This application would provide the minimum information needed by EPA to characterize a refiner's/importer's participation, establish the applicable standards if the 1997–98 average is less than 150 ppm, and establish our enforcement program for refiners/ importers in this area for gasoline entering or leaving the area. Participation on the part of any refinery or importer is voluntary. At any time, a refiner/importer who previously opted into the GPA program may produce gasoline meeting the standards in Table IV.C–1 in the GPA, or may cease producing gasoline for the GPA (and produce gasoline meeting the standards in Table IV.C–1 solely outside of the GPA). Such a decision would affect the averages/caps which apply to the gasoline sold in the GPA. Gasoline sold in the GPA that is not designated as GPA gasoline is considered Non-GPA gasoline for purposes of compliance with the corporate pool average requirement and refinery average requirements.

vii. How Will EPA Establish the GPA in Adjacent States?

EPA is establishing a geographic phase-in area that encompasses eight states (MT, ND, ID WY, CO, UT, NM, AK). In addition, counties and tribal lands in states immediately adjacent to these which received a majority of their gasoline in calendar year 1999 from a refinery(ies) located within the GPA will be covered by the phase-in area provisions. The criteria to identify these additional counties and tribal areas are designed to identify areas whose gasoline distribution system is closely tied to the eight states such that they share the same characteristics of gasoline supply. Therefore, dispensing outlets (retail and private) in such areas will continue to have access to that gasoline in most cases. Distribution and production of gasoline in these additional areas will be subject to the same standards and requirements as gasoline in the eight states identified above.

At this time, EPA is not able to identify all the counties and tribal lands that would be included in the phase in area. In light of the air quality benefits of introducing low sulfur gasoline as quickly as possible, we want to ensure that the phase-in area is accurately identified and that including any areas outside these eight states will not have a significant adverse air quality impact on any counties or tribal lands that are included in the phase-in area. EPA will be working with interested stakeholders will to conduct an assessment to determine which counties/tribal lands within the immediately adjacent states meet the criteria as described in the regulatory text. EPA expects to complete action on this assessment by December 31, 2000. c. How Does the Sulfur Averaging, Banking, and Trading Program Work?

The sulfur ABT program provides flexibility to refiners by giving them more time to bring all of their refineries into compliance with the corporate averages in 2004 and 2005 as well as the 30 ppm individual refinery standard in 2005 and beyond. ABT will provide the opportunity for reduced costs by allowing the industry the flexibility to average sulfur levels among different refineries, between companies, and across time. With ABT, some refineries will be able to delay installation of desulfurization equipment, because other refineries will generate sulfur allotments and credits through early sulfur reductions. In this way, installation of desulfurization technology will be spread out over a longer period of time than would be the case without ABT. Since, with the banking provisions, reductions in annual average sulfur levels which occur as early as 2000 have a value during program implementation, the ABT program provides an incentive for technological innovation and the early implementation of refining technology.

The ABT program also provides the opportunity for meaningful emissions reductions in 2004 because it allows the Tier 2 standards to be implemented earlier than might otherwise have been possible (if the Tier 2 standards were delayed to provide the refining industry more time to comply), and because it provides direct environmental benefits even in the years before Tier 2 vehicles are introduced. One benefit is related to the effect of gasoline sulfur on exhaust emissions, as discussed in the Regulatory Impact Analysis. This benefit will result both from older vehicles on the road (Tier 0 and Tier 1 emission control technologies, which have some degree of sulfur sensitivity and will benefit from sulfur reductions which occur prior to implementation of the refiner and refinery standards summarized in Table IV.C–1) and from NLEV vehicles (which are more sensitive to sulfur than earlier technologies) which will continue to be sold while Tier 2 vehicles are phased-in. Another environmental benefit is the reduction in atmospheric sulfur loads as a direct result of reduced gasoline sulfur levels, leading to reduced emissions of sulfur-containing compounds from motor vehicles.

The following sections explain the requirements for participation in the sulfur ABT program for allotments and credits.

Sulfur Allotment Program

i. Generating Allotments Prior to 2004

To provide additional incentive for early sulfur reductions and to enhance the overall feasibility and cost effectiveness of the gasoline sulfur control program, we are implementing a sulfur allotment program. While few commenters supported the sulfur allotment concept in the NPRM, a number suggested that greater flexibility for compliance in the early years would be helpful. The program described below is in addition to the early sulfur credit program described elsewhere.

For 2003, refineries can generate sulfur allotments (in ppm-gallons) by producing gasoline containing less than 60 ppm sulfur on an annual-average basis. This 60 ppm "trigger" was chosen to reward refineries who demonstrate compliance using technology designed to meet the 30 ppm standard before 2005. Once this 60 ppm trigger is reached, allotments will be calculated based on the amount of reduction from 120 ppm.[84] However, these allotments may be discounted depending on the actual sulfur level. If a refinery fully demonstrates compliance by producing gasoline with an annual average sulfur level of 0 to 30 ppm, the allotments retain their full value—they are not discounted at all. For actual sulfur levels of 31–60 ppm, which are indicative of a partial demonstration of compliance with the ultimate low sulfur standard, the allotments are discounted 20 percent. For example, consider a refinery that has an average sulfur level of 50 ppm at the end of 2003. That refinery would have generated 56 sulfur allotments [(120 ppm − 50 ppm) × 0.8 × Volume (in gallons)] to be used or sold in 2004. If that same refinery instead produced fuel with an average sulfur level of 20 ppm at the end of 2003, then it would have generated 100 sulfur allotments [(120 ppm − 20 ppm) × volume (in gallons)] to be used or sold in 2004.

ii. Generating Allotments in 2004 and 2005

For 2004 and 2005, refiners or importers (but not individual refineries)

[84] If a refinery has a baseline sulfur level higher than 120 ppm (as described below in IV.C.1.c.v.), then credits are generated from the baseline to 120 ppm and allotments from 120 ppm to the new sulfur level (and discounted 20 percent if applicable).

can generate allotments by producing gasoline that has a sulfur level below the annual corporate average standard (120 ppm and 90 ppm). The number of allotments generated is equal to the difference between 120 ppm (or 90 ppm) and the corporate average sulfur level. Allotments generated by refiners or importers in 2004 and 2005 are not discounted, unlike some of those that are generated by refineries in 2003. Refiners that sell fuel to the GPA may also generate allotments by producing fuel that is cleaner than the corporate average standards, regardless of the volume of fuel that is produced for use in the GPA. On the other hand, as explained in Section IV.C.2., gasoline produced by small refiners who are complying with the standards in Table IV.C.–3 cannot be used to generate sulfur allotments since these producers are not required to meet a corporate average standard.

iii. Using Allotments in 2004 and 2005

Refiners and importers can use sulfur allotments that they generate or purchase from other refiners/importers to demonstrate compliance with the 120 ppm corporate standard in 2004 and the 90 ppm corporate standard in 2005. Each refiner's sulfur allotment for 2004 and 2005 will be calculated based on the total volume of gasoline imported and produced at their refineries (or only imported gasoline in the case of companies that only import gasoline) and the corporate pool average standard for that year. In anticipation of exceeding or falling short of the standard for any one year, companies may trade sulfur allotments, either in the compliance year or earlier (as early as the year 2000). For example, a refiner that expects to produce a total of 2.5 billion gallons of gasoline in 2004 has a sulfur allotment of 300 billion ppm-gallons (120 ppm × 2.5 billion gallons). If its corporate pool average is actually 200 ppm in 2004, it will exceed its 2004 allotment by 200 billion ppm-gallons (since 200 ppm × 2.5 billion gallons = 500 ppm-gallons), and must obtain sulfur allotments from another refiner to offset this increase. Similarly, if this refiner expects to average 80 ppm in 2004, it has an excess of 100 billion ppm-gallons to trade to other refiners. However, if a refiner trades away part of its allotment, the refiner must still comply with the corporate standard, just as another refiner has to do if it does not trade allotments.

In 2005, refiners must comply both with the corporate average standard and the refinery average standard for each of their refineries. Once a refiner has established compliance with the 90 ppm corporate average standard (with or without the use of allotments), each of its refineries can then establish compliance with the 30 ppm refinery standard through actual production of 30 ppm gasoline or through the use of *excess* allotments and/or sulfur credits. Once compliance with the 90 ppm corporate pool average standard is established, the refiner would use 90 ppm as each of its refineries actual sulfur level, then apply an appropriate number of credits or allotments to meet the 30 ppm refinery average standard for each refinery. (See discussion below for an explanation of how a refiner can use both sulfur ABT credits and allotments to comply with the refinery average standard in 2005.)

iv. How Long Do Allotments Last?

We expect most refiners will trade sulfur allotments well before the end of each compliance year so they will have the needed certainty of compliance with the corporate average standard. Our program allows such trades to occur at any time during the year, although the refiner is liable for any shortfall in compliance resulting from having traded away too many allotments. A refiner may also carry over excess 2004 allotments (those generated in 2003 or 2004) for compliance with the 90 ppm corporate standard for 2005. However, those allotments must be discounted by 50 percent. This 50 percent discount factor is needed to equalize the emission impact of sulfur control between 2004 and 2005. In 2005, there is an extra model year of NLEV/Tier 2 vehicles relative to 2004. In addition, the NLEV/Tier 2 fleet is one year older in 2005 than 2004. This increased age translates into higher vehicle emissions due to general deterioration. Since sulfur acts on a percentage basis, the absolute emission increase due to sulfur impacts on vehicle emission control systems in 2005 is higher than in 2004.

As discussed below in section IV.C.1.c.x, a refiner or importer may convert allotments into credits in 2004 and 2005 for compliance with the refinery average standards in 2005 and beyond. All transactions between refiners involving sulfur allotments must conclude by the last day of February in the calendar year following the compliance year in which the allotments are to be used.[85]

[85] Allotments used for GPA gasoline compliance may be retained until February 2007. Allotments used for small refiner gasoline compliance may be retained until February 2008.

Sulfur Credit Program

v. Establishing Individual Refinery Sulfur Baselines for Credit Generation Purposes

The purpose of establishing a sulfur baseline for each refinery is to provide a starting point for determining sulfur credits for reductions in gasoline sulfur levels. We proposed that refiners would have to establish a sulfur baseline for each individual refinery, by submitting to us data establishing their annual average gasoline sulfur level based on the average of their 1997 and 1998 operations. We would review the data and, barring any discrepancies, approve a sulfur baseline for each refinery. We received comments supporting this option as well as comments stating that the time involved for this application and approval process would delay the refiner's ability to plan for and begin construction of gasoline desulfurization technology. Refiners would want the certainty of an approved sulfur baseline before making investment decisions, and thus would wait to obtain EPA's approval before proceeding. We also received comments about what year(s) would be most appropriate to use to establish a sulfur baseline. Some of these comments argued for the use of existing, approved 1990 baselines, or some adjusted version of 1990 baselines, rather than new data, to expedite the process of establishing sulfur baselines.

We also proposed a different sulfur baseline for reformulated gasoline (RFG) produced in the summer for those refineries which produce reformulated gasoline. While the conventional gasoline sulfur baseline (and the baseline for winter RFG) was proposed to be tied to current sulfur levels, the baseline for summer reformulated gasoline was proposed to be 150 ppm, the approximate level we expect summer reformulated gasoline to contain in 2000 and beyond because of the Phase II reformulated gasoline requirements, which take effect in 2000. We argued that winter RFG did not have any de facto sulfur restrictions, and thus winter RFG should be counted with conventional gasoline for the purpose of credit generation relative to the refinery's conventional gasoline sulfur baseline.

Since the proposal, we have learned that overall gasoline sulfur levels (conventional plus reformulated) are significantly lower than they were in 1990. As explained in the Regulatory Impact Analysis, national average sulfur levels when both conventional and reformulated gasolines are considered dropped to 306 ppm in 1997 and 268 ppm in 1998, compared to the 1990 national gasoline sulfur average of 339 ppm, decreases of 10 and 21 percent, respectively. The substantial drop between 1997 and 1998 seems to be related to the mandatory use of the Complex Model, which began in 1998 and had implications for both reformulated and conventional gasoline compliance. Thus, we have become convinced that the most appropriate sulfur baseline would be based on data which establish current sulfur levels, not on data which are nearly ten years old. We considered reducing all 1990 baselines by 21 percent to reflect the national average decrease since 1990, but determined that this approach would be inappropriate because some refiners have reduced levels substantially more than 10–21 percent since 1990, and would thus be eligible to generate a very large number of credits for reductions that have already been made.

Furthermore, as we proposed, and some commenters argued, we have concluded that averaging data from two years is the most appropriate approach, because averaging over two years will help to account for any unusual variations in operations that may have occurred at individual refineries in either of these years. We concluded that averaging data from 1998 and 1999 is not feasible, because the 1999 data will not be fully available to EPA until after the reporting deadline of May 2000. Hence, we believe it is preferable to use 1997 and 1998 data, rather than delaying the time baselines are established. We do not expect significant changes in 1999 sulfur levels relative to 1998 levels, so we believe the use of the 1997–1998 data provides a reasonable representation of current sulfur levels.

We have also learned that summer reformulated gasoline is already averaging close to our expected sulfur level for the year 2000. Winter RFG does not show this same decrease, presumably because refiners are shifting high sulfur blendstocks out of RFG in the summer but back into RFG in the winter to maintain compliance with the conventional gasoline antidumping requirements. Thus, it appears that if we held summer RFG to a lower baseline, as proposed, we would have to raise the winter RFG baseline commensurately to reflect actual refinery operations. The net environmental impact would be no different than if we had a single sulfur baseline applying to all RFG, or to all gasoline produced at the refinery, since the annual pool sulfur levels are constant even while there may be seasonal variations. Therefore, we are not finalizing a separate sulfur baseline for summer RFG, but rather combined conventional and reformulated gasoline sulfur levels.

Having considered the comments we received and the new data available to us, we have concluded that refiner sulfur baselines should be established from 1997 and 1998 operating data. Hence, we are requiring refiners which wish to generate sulfur credits prior to 2004 to establish a 1997–98 sulfur baseline for each refinery at which they intend to generate credits. We believe the process we have defined will minimize the burden to the industry and the time it will take for us to review and approve the sulfur baselines. Specifically, refiners which plan to generate sulfur credits must submit to us information which establishes the batch report numbers, sulfur levels, and volumes of each batch of gasoline produced in 1997 and 1998, as well as the annual average sulfur level calculated from these data. Within 60 days, we will review the application and notify the refiner of approval or of any discrepancies we find in the data submitted. If we do not respond within 60 days, the baseline should be considered to be approved.

While we expect most refiners will apply for a sulfur baseline in the near future (to maximize the time that they can generate credits before 2004), there is no cut-off date for applying for a sulfur baseline. However, if the refiner wishes to generate credits for a given calendar year, we must receive his baseline application no later than September 30 of that year to provide us adequate time to review the baseline prior to the end of the year (at which time any credits generated in that year would be assessed and reported by the refiner). We believe that this approach for establishing sulfur baselines meets our goal of providing a workable ABT program that refiners can take advantage beginning in the year 2000, without sacrificing the environmental benefits of the sulfur standards.

Foreign refiners which have already established an individual refinery baseline with us, and thus have submitted reports on all batches of gasoline sent to the U.S. in 1997 and 1998, may follow this same procedure if they wish to generate sulfur credits prior to 2004. Foreign refiners which have not reported 1997–98 gasoline qualities to us must follow an alternate approach. Specifically, they must follow the general requirements of our protocol for establishing individual refinery baselines (see §§ 80.91–94 and also § 80.410) by providing sufficient data to establish the volume of gasoline imported to the U.S. from each refinery in 1997–98 and the annual average sulfur level of that gasoline. If the test method used to identify the sulfur level differs from the one specified in today's action, the refiner must provide sufficient information about the test method to allow us to evaluate the appropriateness of the alternative. Because this information will be new to us, we may require more time to review and approve their 1997–98 sulfur baseline. But, consistent with our previous handling of foreign refiner submissions, once we have determined that the submission is complete and the protocol has been followed, they may use the baseline while waiting for our formal approval. However, the refiner will be held to the baseline that is ultimately approved. A foreign refiner who is unable to generate adequate data to establish a 1997–98 sulfur baseline will not be permitted to generate sulfur credits in 2000–2003.

Small refiners that plan to request small refiner standards (as provided in Section IV.C.2 below) which also want to generate early sulfur ABT credits will use the same data required to define their small refiner baseline to determine their baseline for the ABT program. In other words, if a refiner becomes a small refiner under our definition and procedures, credits generated by that refinery would be calculated relative to the refinery's actual 1997–98 sulfur average. The trigger for generating sulfur credits under the ABT program (discussed in the next section) would still apply for small refiners generating credits prior to 2004 relative to their 1997–98 sulfur average. In addition, the applicable interim sulfur standard for small refiners who generate credits through sulfur reductions prior to 2004 will be calculated based on the reduced sulfur level, rather than the 1997–98 baseline level, as explained below in Section IV.C.2.

Importers and gasoline blenders will not be assigned a sulfur baseline because they are not eligible to generate early credits (prior to 2004) under the ABT program. This includes gasoline refiners who are also importers; such parties cannot generate sulfur credits prior to 2004 on the basis of their imported gasoline but may only generate credits based on the gasoline produced by their refinery(ies). It also includes oxygenate blenders, who, as discussed in Section VI below, are not subject to the sulfur standards but are responsible for compliance with the downstream provisions.[86] For importers

[86] Refiners may, however, include oxygen added downstream of the refinery when determining

Continued

and most gasoline blenders, this represents a change from our proposal, but one we believe is appropriate and necessary to ensure that the environmental benefits of the ABT program are maintained. The ABT program allows the refining industry to trade off early sulfur reductions (2000–2003) for slight delays in complying with the 30 ppm refinery average standard in 2005–2006.[87] We have designed the ABT program to ensure that sufficient credits can be generated by refiners (domestic or foreign) to enable a smooth transition to the 30 ppm standard. Importers and blenders do not have the same need for the ABT program that refiners have because they will not have to make the same level of investment in desulfurization technology and thus do not need credits generated before 2004 to help their transition to the 30 ppm average standard after 2004. Furthermore, credits could be generated by importers without the overall pool of imported gasoline becoming incrementally cleaner. For example, say that Importer A had a 1997/98 sulfur baseline of 600 ppm and Importer B had a sulfur baseline of 100 ppm. In 2002, Importer B could transfer/sell its 100 ppm gasoline to Importer A prior to unloading the fuel at the port of entry. Once the import transaction was completed, Importer A will have generated 500 ppm (multiplied by the fuel volume) credits without any fuel becoming incrementally cleaner. We are concerned that if importers and blenders were allowed to generate early credits, they would generate far more credits than needed to make the ABT program work, without necessarily achieving early environmental benefits—credits which either importers or refiners would be able to use to delay compliance with the 30 ppm standard in 2005 and beyond. This would delay the environmental benefits of our program by prolonging the industry's transition to the 30 ppm standard.

In the proposal, we also discussed the need for a baseline gasoline volume as well as a baseline sulfur level. This stemmed from the design of our current conventional gasoline anti-dumping program, which requires a baseline volume so that we can confirm that conventional gasoline is no dirtier now than it was in 1990. However, for the gasoline sulfur ABT program, we have determined that there is no need to restrict refineries' sulfur baselines (against which they can generate sulfur credits) to a specific volume of gasoline. The purpose of the ABT program is to encourage early sulfur reductions by some refineries, and we see no need to limit the amount of credits such a refinery can generate on the basis of a historic volume of gasoline production. In fact, additional volumes of cleaner gasoline should achieve additional early environmental benefits.

vi. Generating Sulfur Credits Prior to 2004

In our proposal, we discussed a credit generation trigger of 150 ppm for early credit generation (2000–2003), arguing that we wanted to encourage investment in desulfurization technologies that refineries ultimately need to get to a 30 ppm average. Many comments we received argued that the 150 ppm trigger was too restrictive, requiring capital investments that most refiners could not make earlier than 2004 (due to construction limitations, among other reasons). Thus, few credits would be generated, and without sufficient certainty that credits would be generated, refiners would not be able to count on the flexibility that the ABT program was intended to provide when planning their compliance strategies for 2004 and beyond.

Having considered these comments and reanalyzed the ability of the industry to comply with the standards in 2004 (as we discussed above at the introduction to section IV.C.1), we have concluded that the proposed 150 ppm trigger would inappropriately limit the credits available. While we want to encourage refiners to make reductions early, we do not want to preclude refiners from making less capital intensive sulfur reductions in the short term while they prepare to reach the 30 ppm average in the long term. At the same time, we believe that a refinery should be required to demonstrate that the sulfur reduction was real and not just a consequence of national variations from year to year. Hence, we are establishing a trigger which we believe represents a sulfur reduction that requires action above and beyond simple annual or even seasonal fluctuations in crude oil sulfur level or product slate variations that could have a very small impact on annual sulfur average.

During the period 2000–2003, credits can be generated annually by any refinery that produces gasoline averaging at least 10 percent lower than that refinery's baseline sulfur level. In other words, to generate credits, the refinery's annual average sulfur level for all of its gasoline on average must be 0.9 × (baseline sulfur level). Once this "trigger" is reached, credits will be calculated based on the amount of reduction from the refinery's sulfur baseline. For example, if in 2002 a refinery reduced its annual average sulfur level from a baseline of 450 ppm to 150 ppm (well below the trigger of 0.9×450=405 ppm), its sulfur credits will be determined based on the difference in annual sulfur level (450–150=300 ppm) multiplied by the volume of gasoline produced in 2002. Similarly, foreign refineries with an individual sulfur baseline can generate credits in these years as long as the annual average sulfur level of the gasoline imported to the U.S. from that refinery is lower than 90 percent of the baseline sulfur level.

Although by adopting a more modest trigger for credit generation we are enabling more credits to be generated, the environment will still benefit from our program. Although the use of a more modest trigger keyed to each refinery's sulfur baseline may allow more credits to be generated, we believe this will only occur because the credit program is providing incentives to refineries to reduce sulfur levels earlier than they would have otherwise, particularly with a strict 150 ppm trigger. Thus, more lower sulfur gasoline will be in the marketplace prior to 2004 than would otherwise have occurred, given our understanding of the state of desulfurization technologies and the likely pattern of investments by the industry. With our corporate average and cap standards, sulfur levels will continue to decrease after 2004, even if individual refineries take an added year or two to meet the 30 ppm standard.

We had also proposed that credit generation prior to 2004 would be different for reformulated gasoline than for conventional gasoline, because reformulated gasoline's assigned sulfur baseline was proposed to be 150 ppm. Thus, we proposed that credits could only be generated from reformulated gasoline if the sulfur level averaged below 150 ppm, and that the credits would be calculated based on the difference between 150 ppm and the new, lower average. Since we have not finalized a separate baseline for reformulated gasolines, we are not adopting a different process for generating credits from reformulated gasoline. All gasoline produced at the refinery in 2000 (and beyond) is considered in calculating the annual average sulfur level, compliance with the 90 percent trigger, and the sulfur credits earned, if any.

compliance with the sulfur standards and the provisions of the ABT program. This is consistent with existing provisions for reformulated and conventional gasolines.

[87] As explained in Section IV.C.1.c.ix, credits generated before 2004 expire in 2006, except for small refiners and credits used for GPA gasoline compliance.

Several states have adopted or are considering adopting gasoline sulfur control programs (see discussion at section IV.C.1.d below on state sulfur programs). While we had proposed to exclude this gasoline from sulfur credit generation, we have reconsidered our position. Gasoline produced in response to state[88] requirements can be included in the refinery's calculation of sulfur credits generated in a given year. However, this gasoline will be included in the total volume of gasoline produced by that refinery, requiring the annual average sulfur level for total gasoline produced at that refinery to exceed the trigger specified above to generate any credits at all.

vii. Generating Sulfur Credits in 2004 and Beyond

In 2004 and beyond, refineries, blenders, and importers can generate credits, but only if the actual annual sulfur level of all gasoline produced or imported averages below 30 ppm, and only for the difference between the standard and the actual annual sulfur average. (For example, a refinery producing gasoline in 2005 that averages 25 ppm can generate 30–25=5 ppm sulfur credits on the total volume of gasoline produced at that refinery.) However, since in 2004 and beyond importers are the regulated party responsible for ensuring that imported gasoline meets the sulfur standards, foreign gasoline would in effect generate sulfur credits through the importer beginning in 2004. Foreign refineries which want to send gasoline containing less than 30 ppm sulfur to the U.S. would still benefit from doing so by making appropriate arrangements with importers, which are subject to all of our standards.

viii. Using Sulfur Credits

Refineries, blenders, and importers can use sulfur credits to demonstrate compliance with the 30 ppm annual average refinery standard in 2005 and beyond, if they are unable to meet the standard with actual gasoline production. During 2005 and 2006 only, refineries may use credits banked by that refinery in 2000–2003 as a result of early sulfur reductions, or credits purchased from other refineries which have banked early sulfur credits. Blenders and importers can purchase credits from refiners (including any foreign refiners which generated early credits), or use credits they generated in 2004 and beyond. All transactions will have to be concluded by the last day of February after the close of the annual compliance period (2005, 2006, etc.).

As discussed above, 2005 is the only year when averaging and trading against the corporate average and averaging, banking, and trading against the refinery average are both allowed. In that year, sulfur credits may only be used against the 30 ppm standard for each refinery once the refiner has demonstrated compliance with the corporate pool average standard. The refiner must meet his corporate average based on actual sulfur levels or through a trade for sulfur allotments if it falls short of the 90 ppm corporate average standard. At that point, each of his refineries is evaluated for compliance with the 30 ppm refinery average standard. Those refineries that are not producing gasoline averaging 30 ppm sulfur must obtain sulfur credits generated in 2005 or earlier and/or sulfur allotments to bring the refinery's sulfur average from the actual level (a maximum of 90 ppm for each refinery, since by meeting the corporate average, even if in part through the use of allotments, each refinery in the company will be considered to average no more than 90 ppm) down to 30 ppm.

Refineries or importers which sell some or all of their gasoline in the GPA (and which have elected to participate in the phase-in) may also use sulfur credits to meet their refinery averages in 2004–2006. However, because this gasoline must be designated for sale in the GPA, they must account separately for compliance with the 150 ppm refinery average for gasoline sold in the phase-in area and with the 30 ppm refinery average for gasoline sold outside of that area. Thus, in 2004, such refiners/importers may use sulfur credits to establish compliance with the 150 ppm standard for gasoline sold in the phase-in area, if required. In 2005 and 2006, they may use credits to meet the 150 ppm standard for gasoline sold in the area and/or use credits to meet the 30 ppm standard for gasoline sold outside of the area.

As explained in section IV.C.1.b., some of the refiners participating in the GPA are exempt from the corporate average standards, but may use either sulfur credits or sulfur allotments in 2004–2006 to establish compliance with the 150 ppm refinery average standard. Those that are not exempt from the corporate average standards may use sulfur allotments only to meet the corporate average standards. For such refiners, compliance with the corporate average standard will be measured first (using allotments if needed), then compliance with the refinery average standard (using credits and/or allotments as needed) in the same manner as described above for refiners who sell all of their gasoline outside of the GPA.

Foreign refineries are not required to comply with the 30 ppm refinery standard in 2005 and beyond; instead, compliance for foreign gasoline is required by the importer. Sulfur credits generated by foreign refineries prior to 2004 will still have value, since these refineries can sell sulfur credits to U.S. refineries, blenders, or importers who need credits to meet the standard in 2005 or beyond. In fact, foreign refiner's credits could simply be transferred to the importer which is importing that refinery's gasoline into the U.S. For example, a foreign refiner could send gasoline exceeding 30 ppm on average to an importer and transfer the appropriate amount of sulfur credits it generated prior to 2004 to allow the importer to meet the 30 ppm standard. Similarly, after 2004 a foreign refiner may send gasoline containing less than 30 ppm to the U.S. through an importer, and the importer would benefit from generating credits (and presumably would include the value of these credits in the financial transaction with the foreign refinery).

As explained in Section IV.C.3.b. above, in 2005 no batch of domestically produced or imported gasoline can exceed 300 ppm, and a refiner's/importer's annual corporate pool average sulfur level cannot exceed 90 ppm, except for gasoline sold in the GPA or by small refiners complying with the standards in Table IV.C.–3. In 2006 and beyond, sulfur is capped at 80 ppm and there is no longer a corporate pool average standard. These standards (as well as the 300 ppm cap and corporate pool averages) cannot be met through the use of credits generated under the ABT program. As described above, credits may only be applied to demonstrate compliance with the 30 ppm refinery standard, not to the corporate pool average or the cap. Given the limitations that the 80 ppm cap places on sulfur levels in 2006 and beyond, we do not expect many sulfur credits to be used in future years of this program (since, even with the use of credits, no gasoline may exceed 80 ppm in these years).

We allow an individual refinery that does not meet the 30 ppm standard in a particular year to carry forward the credit debt one year. Under this provision, the refinery will have to make up the credit deficit and come into compliance with the 30 ppm standard the next calendar year, or face penalties. This provision will in no way absolve the refiner from having to meet the

[88] Excluding California.

applicable per-gallon cap standard or, when applicable, the corporate average standard. This provision will provide some relief for refiners faced with an unexpected shutdown or that otherwise were unable to obtain sufficient credits to meet the 30 ppm standard. This provision is only available through 2010. After that time, we expect many refineries to be able to consistently operate below 30 ppm, generating a pool of credits which other refineries could purchase in the event of an unforeseen upset. However, in no circumstances after 2005 can the refinery produce gasoline exceeding the 80 ppm per-gallon cap standard (with the exception of small refiners, as discussed in Section IV.C.2 below). The carry-forward provision does not apply to compliance with the 150 ppm refinery average standard applicable in the GPA.

We have some concern that the potential exists for credits to be generated by one party and subsequently purchased or used in good faith by another, and later found to have been calculated or created improperly or otherwise determined to be invalid. For this reason, we proposed that both the seller and purchaser would have to adjust their sulfur calculations to reflect the proper credits and either party (or both) could be deemed in violation of the standards and other requirements if the adjusted calculations demonstrate noncompliance with an applicable standard. One commenter, representing a number of refiners, objected to this approach.

Nevertheless, our strong preference is to hold the credit or allotment seller liable for the violation, as opposed to the credit or allotment purchaser. As a general matter we would expect to enforce a shortfall in compliance calculations (caused by the good faith purchase of invalid credits) against a good faith purchaser only in cases where we are unable to recover valid credits from the seller to cover the compliance shortfall. Moreover, in settlement of such cases we would strongly encourage the seller to purchase credits to cover the good faith purchaser's credit shortfall. Under the deficit provisions of section 80.205(e), for compliance periods through 2010, a credit shortfall may be corrected if the conditions of that section are met. EPA will consider covering a credit deficit through the purchase of valid credits a very important factor in mitigation of any case against a good faith purchaser, whether the purchase of valid credits is made by the seller or by the purchaser.

Some commenters stated that sulfur credits should be transferred directly from the refiner or importer that generated them to the party that will use them, as we had proposed. We believe that this helps to ensure that parties purchasing credits will be better able to assess the likelihood that the credits will be valid, and aids compliance monitoring. Therefore, the final rule adopts this provision, with the exception that where a credit generator transfers credits to a refiner or importer who cannot use all the credits, that transferee may transfer the credits to another refiner or importer. That second transferee cannot again transfer the credits; they must either be used or terminated by the second transferee. Nevertheless, there is nothing in the final rule that would prevent a person who is not a refiner or importer from facilitating the transfer of credits from parties that have generated them to parties who need them for compliance, *e.g.,* a broker who would act like a real estate broker. Therefore, under today's rule, any person may act as a credit or allotment broker, whether or not such person is a refiner or importer, so long as the title to the credits or allotments are transferred directly from the generator to the user. Furthermore, any party (*e.g.,* refiner, importer, or blender) who can generate and hold credits may also resell them.

ix. How Long Do Credits Last?

The ABT program is designed to encourage sulfur reductions earlier than the standards require, by providing a market for credit generation. The emissions benefits of these early reductions are most valuable in the early years of the ABT program when national average levels remain substantially higher than the final 30 ppm average standard. At the same time, these emissions reductions are offset in time by higher emissions incurred by later vehicles which use gasoline with a higher sulfur level. Because the overall intention of the gasoline sulfur program is to enable and protect Tier 2 vehicles and provide time for refiners to select and construct desulfurization equipment, sulfur credits should have a limited life to limit the degree to which later Tier 2 vehicles are exposed to higher sulfur levels.

The ABT program is also designed to ease implementation of the new standards, particularly the refinery average standard, and the credits will be of their greatest value to refineries during the first few years of the program. ABT is not intended to permit a refinery to operate substantially above the standard for a protracted time period. While limiting credit life may reduce the incentive to generate credits for some refineries, the credit program will be of relatively small value to any refinery/importer that held credits for a protracted period of time and did not need to use them. This is particularly true in 2006 and beyond, when the 80 ppm cap limits the need for and value of any credits the refinery may possess.

Hence, we are finalizing limitations on the life of credits which differ somewhat from our proposal. Credits generated prior to 2004 must be used for compliance purposes and calculations with respect to gasoline produced on or before December 31, 2006. These credits can be used to meet the 30 ppm standard in 2005 or 2006. This expiration date applies to credits used by the refinery which generated the credits, as well as credits transferred to another refinery. While the proposal presented a life through 2007 for credits generated early, we have shortened this life span one year to reflect the fact that early credits are intended to enable and ease compliance with the 30 ppm standard in the first years of the program, allowing refiners to spread out investments without compromising the environmental benefits of the program. At the beginning of 2006, all gasoline (except that produced by small refiners and that marketed in the GPA) will be capped at 80 ppm, and by the end of 2006, every refinery should be capable of producing gasoline that meets the 30 ppm standard. Hence, the value of the early credits diminishes greatly. It should be noted that early credits can be used for GPA certified gasoline through 2006 and for small refiner gasoline through 2007.

Credits generated in 2004 and beyond will have to be used within five years of the year in which they were generated. If these credits are traded to another party during that five year period, they will have to be used by the new owner within that same five years, regardless of when the transfer occurs. This is a change from our proposal, which provided for a potential maximum ten-year life for credits that were generated and then traded in the fifth year to another party. However, we believe this approach is more consistent with our environmental goals of keeping sulfur levels averaging 30 ppm in 2006 and beyond. With the 80 ppm cap, refiners will be able to use only very few credits if they are unable to meet the 30 ppm average in 2006 or beyond. Therefore, limiting credit life to five years will likely have minimal impact on the actual use of credits. A longer credit life will make tracking and enforcement difficult, and could have negative environmental consequences. Hence, we have limited credit life to five years. Consistent with our other recordkeeping and reporting requirements, the five-year expiration date will be assessed as of the last day of February after the five year deadline. Hence, for example, credits generated in 2005 will expire as of the last day of February, 2011. Again, no third-party transfers are allowed.

x. Conversion of Allotments Into Credits

A refiner or importer may convert allotments into credits for compliance with the refinery average standards in 2005 and beyond. Allotments that are generated by reducing gasoline sulfur levels to 30 ppm or higher (defined as Type ''A'' allotments) are equivalent to credits generated in 2000–2003. These allotments may be (1) used as allotments by a refiner for compliance with the corporate average standard in 2004 and 2005 or (2) converted into credits to be used by the refiner's refineries for compliance with the refinery average standard in 2005 and 2006.

Allotments that are generated by reducing gasoline sulfur levels to lower than 30 ppm (defined as Type ''B'' allotments) are equivalent to credits generated in 2004 and beyond (by producing gasoline with less than 30 ppm sulfur). Similar to Type ''A'' allotments, these allotments may be (1) used as allotments by a refiner for compliance with the corporate average standard in 2004 and 2005 or (2) converted into credits to be used by the refiner's refineries for compliance with the refinery average standard in 2005 and beyond.

Allotments or credits that are used by refiners for compliance with the GPA gasoline standards must be used by the last day of February 2007. Allotments or credits used by small refiners for compliance with the small refiner standards must be used by the last day of February 2008. Any allotments, whether Type ''A'' or ''B'', that are carried over for compliance with the corporate and refinery average standards for 2005 must be discounted by 50 percent as discussed in above. Any allotments that are converted to credits (*e.g.,* in 2004) and then carried over to 2005 are not discounted. However, once the conversion and carry-over has taken place (such that the allotments have become credits), the conversion cannot be reversed without applying the discount factor. That is to say, once a 2003 or 2004 allotment is converted to a credit and carried over to 2005, the credit can only be re-converted into an allotment that is discounted 50 percent.

d. How Are State Sulfur Programs Affected by EPA's Program?

Section 211(c)(4)(A) of the CAA prohibits states [89] from prescribing or attempting to enforce controls or prohibitions respecting any fuel characteristic or component if EPA has prescribed a control or prohibition applicable to such fuel characteristic or component under section 211(c)(1). This preemption applies to all states except California, as explained in section 211(c)(4)(B). For states other than California, the Act provides two mechanisms for avoiding preemption. First, section 211(c)(4)(A)(ii) creates an exception to preemption for state prohibitions or controls that are identical [90] to the prohibition or control adopted by EPA. Second, states may seek EPA approval of SIP revisions containing fuel control measures, as described in section 211(c)(4)(C). EPA may approve such SIP revisions, and thereby ''waive'' preemption, only if it finds the state control or prohibition ''is necessary to achieve the national primary or secondary ambient air quality standard which the plan implements.''

We are adopting the sulfur standards pursuant to our authority under section 211(c)(1). Thus, we believe that today's action results in the clear preemption of future state actions to prescribe or enforce fuel sulfur controls. [91] States with fuel sulfur control programs not already approved into their SIPs will therefore need to obtain a waiver from us under the provisions described in section 211(c)(4)(C) for all state fuel sulfur control measures, unless the state standard is identical to our sulfur standard.

Section 211(c)(4)(A) preempts state fuel controls if EPA has ''prescribed'' federal controls. We read this language to preempt non-identical state standards on the date of promulgation of the standards, as opposed to the date the standards become enforceable. Thus, today's action preempts state actions as of December 21, 1999, even though the standards will not require sulfur reductions until 2004. This interpretation is consistent with EPA actions applying other federal fuel measures. *See* 54 Fed. Reg. 19173 (May 4, 1989) (noting preemption of Massachusetts state RVP measure before start of first control period for federal RVP). We also believe this interpretation is consistent with the intent behind section 211(c)(4)(A). Though the standards are not immediately enforceable, they will have an immediate impact on refiners' investment decisions. We believe, by adopting 211(c)(4)(A), Congress intended to limit state fuel controls that differ from the federal programs, for example, in the judgments as to level of the standard or its stringency. The lead time to implement a standard should be treated the same way.

Aside from the explicit preemption in Section 211(c)(4)(A), a court could also consider whether a state sulfur control is implicitly preempted under the Supremacy Clause of the U.S. Constitution. Courts have determined that a state law is preempted by federal law where the state requirement actually conflicts with federal law by preventing compliance with both federal and state requirements, or by standing as an obstacle to accomplishment of Congressional objectives. A court could thus consider whether a given state sulfur control is preempted, notwithstanding waiver of preemption under 211(c)(4)(C), if it places such significant cost and investment burdens on refiners that refiners cannot meet both state and federal requirements in time, or if the state control would otherwise meet the criteria for conflict preemption.

2. Hardship Provision for Qualifying Refiners

This section describes various provisions for certain qualifying refiners who may face hardship circumstances.

a. Hardship Provision for Qualifying Small Refiners

In developing our gasoline sulfur program, we evaluated the need and the ability of refiners to meet the 30/80 standards as expeditiously as possible. This analysis is described in detail in the RIA. As a part of this analysis, we found that while the majority of refiners would be able to meet the needed air quality goals in the 2004–2006 time frame, there would be some refiners who would face particularly difficult circumstances which would cause them to have more difficulty, in comparison

[89] The term ''state'' or ''states'' includes political subdivisions thereof.

[90] In evaluating whether a state fuel prohibition or control is ''identical'' to a prohibition or control adopted by EPA, EPA might consider but is not limited to the following factors in comparing the measures: (1) The level of an emission reduction or pollution control standard; (2) the use of ''per gallon'' or ''averaged'' amounts in setting that level; (3) the effect on that level (if averaged) of the use of different averaging pools; (4) the lead time allowed to the affected industry for compliance; and (5) the test method(s) and sampling requirements used in determining compliance.

[91] In addition, EPA notes that there are existing federal NO_X performance standards which apply to RFG and conventional gasoline and that state controls respecting NO_X performance are also preempted under 211(c)(4)(A).

to the industry as a whole, in meeting the standards.

In order to ensure that the vast majority of the program could be implemented reasonably quickly in order to achieve the air quality benefits sooner, rather than basing the time frame on the lowest common denominator we have provided an extended phase-in for a small group of refiners that represents less than four percent of the overall gasoline volume, and a much smaller percentage in the areas of greatest environmental need. As described in more detail below, and in Chapter VIII of the RIA, we concluded that refineries owned by small businesses face unique hardship circumstances, compared to larger companies.

The primary reason for this consideration is that small businesses lack the resources available to large companies which enable the large companies (including those large companies that own small volume refineries) to raise capital for investing in desulfurization equipment. The small businesses are also likely to have insufficient time to secure loans, compete for engineering resources, and complete construction of the needed desulfurization equipment in time to meet the standards adopted today which begin in 2004.

The emissions benefits of low sulfur gasoline are needed as soon as possible, for two primary reasons: (1) To reduce ozone and other harmful air pollutants, and (2) to enable vehicle emissions control technology for Tier 2 vehicles. Since our analysis showed that small businesses in particular face hardship circumstances, we are adopting temporary, interim standards that will provide refineries owned by small businesses additional time to meet the ultimate 30 ppm refinery average and 80 ppm per gallon cap standards. This approach allows us to achieve the needed emission reductions in the 2004–2007 time frame because hardship circumstances are expected to be faced by only a small portion of the refining industry.

We believe that these temporary, interim standards are an effective way to phase in the low sulfur standards as expeditiously as is feasible thereby achieving significant air quality benefits in an expeditious manner. This section describes the special provisions we are offering small businesses to mitigate the impacts of our program on them and generally explains the process we undertook to analyze those impacts. Please refer to the RTC document for a detailed discussion of comments received on these provisions, and to the RIA for a more detailed discussion of our analysis of small refiner circumstances.

As explained in the regulatory flexibility analysis in Section VIII.B. of this document and in Chapter 8 of the RIA, we considered the impacts of our proposed regulations on small businesses. We have historically, as a matter of practice, considered the potential impacts of our regulations on small businesses, as discussed in more detail in Section IV.C.2.a.ii., below. The analysis of small business impacts conducted for this rulemaking was performed in conjunction with a Small Business Advocacy Review (SBAR) Panel we convened, pursuant to the Regulatory Flexibility Act as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA). We believe that the temporary, interim standards we are adopting for small refiners contributed to our development of a framework to achieve significant environmental benefits from lower sulfur gasoline in the most expeditious manner that is reasonably practicable. In the SBREFA amendments, Congress stated that ''uniform Federal regulatory * * * requirements have in numerous instances imposed unnecessary and disproportionately burdensome demands including legal, accounting, and consulting costs upon small businesses * * * with limited resources[,]'' and directed agencies to consider the impacts of certain actions on small entities. The final report of the Panel is available in the docket. Through the SBREFA process, the Panel provided information and recommendations regarding:

- The significant economic impact of the proposed rule on small entities;
- Any significant alternatives to the proposed rule which would ensure that the objectives of the proposal were accomplished while minimizing the economic impact of the proposed rule on small entities;
- The projected reporting, recordkeeping, and other compliance requirements of the proposed rule; and,
- Other relevant federal rules that may duplicate, overlap, or conflict with the proposed rule.

In addition to our participation in the SBREFA process, we conducted our own outreach, fact-finding, and analysis of the potential impacts of our regulations on small businesses. Many of the small refiners with whom we and the Panel met indicated their belief that their businesses may close due to the substantial costs, capital and other, of meeting the 30/80 standard without additional time. Based on these discussions and our data analysis, the Panel and we agree that small refiners would likely experience a significant and disproportionate economic hardship in reaching the objectives of our gasoline sulfur reduction program. However, the Panel also noted that the undue burden imposed upon the small refiners by our sulfur requirements could be alleviated with additional time for compliance. We agree with the Panel on both of these points.

For today's action, we have structured a temporary, interim compliance flexibility for qualifying small refiners, both domestic and foreign, based on the factors described below. Specifically, we structured this provision to address small refiner hardship while achieving air quality benefits expeditiously and ensuring that the reductions needed in gasoline sulfur coincide with the introduction of Tier 2 vehicles.

First, the compliance deadlines in the program, combined with flexibility for small refiners, will achieve the air quality benefits of the program quickly, while ensuring that small refiners will have adequate time to raise capital for infrastructure changes. Many, if not most, small refiners have limited, if any, additional sources of income beyond their refinery for financing the equipment necessary to produce low sulfur gasoline. Because these small refiners typically do not have the financial backing that larger and generally more integrated companies have, they need additional time to secure capital financing from their lenders.

Second, we believe that allowing time for sulfur-reduction technologies to be proven-out by larger refiners before small refiners have to put them in place would reduce the risks incurred by small refiners who utilize these technologies to meet the standards. The added time would likely allow for costs of these desulfurization units to decrease, thereby limiting the economic consequences for small refiners. Small refiners are disadvantaged by the economies of scale that exist for the larger refining companies—capital costs and per-barrel fixed operating costs are generally higher for them.

Finally, providing small refiners more time to comply would ensure that adequate engineering and construction resources would be available. Since most large and small refiners will need to install additional processing equipment to meet the sulfur requirements, there will be a tremendous amount of competition for technology services, engineering manpower, and construction management and labor. Our analysis shows that there are limitations to the elasticity of these resources. In addition, vendors will be more likely to contract their services with the major companies first, as their projects will offer larger profits for the vendors.

Providing this flexibility to allow small refiners to deal with hardship circumstances enables us to go forward with the phase-in of the 30 ppm sulfur standard beginning in 2004. Without this flexibility, it is possible that the benefits of the 30 ppm standard would not be achieved as quickly. By providing temporary relief to those refiners that need additional time, we are able to adopt a program that reduces gasoline sulfur levels expeditiously and in a way that is feasible for the industry as a whole.

In addition, we believe the volume of gasoline that will be eligible for the interim standards is small. We estimate that small refiners produce approximately four percent of all gasoline used in the U.S., excluding California. In most cases, gasoline produced by refiners is mixed with substantial amounts of other gasoline prior to retail distribution (due to the nature of the gasoline distribution system). This mixing generally results in only marginal increases in overall sulfur levels. Thus, the sulfur level of gasoline actually used by Tier 2 vehicles should generally be much lower than that produced by individual small refineries under this provision.

i. How Are Small Refiners Defined?

How We Defined ''Small'' Refiner in the Proposal

In identifying the small refiners most susceptible to the economic challenge of meeting the low-sulfur requirements, we closely examined the Small Business Administration's (SBA) definition of small refiner for the purposes of regulation. In that assessment we concluded that the SBA definition provided a reasonable metric for identifying small refiners that would be significantly impacted by the sulfur program requirements. By adopting the SBA definition we could expeditiously provide certainty of small refiner status to refiners who applied for the temporary compliance flexibility. Specifically, we proposed a definition where any petroleum refining company having no more than 1,500 employees throughout the corporation as of January 1, 1999 could apply for the temporary compliance flexibilities. This proposed employee limit included any subsidiaries, regardless of the number of individual gasoline-producing refineries owned by the company or the number of employees at any given refinery.

While we proposed a definition based on corporate employment, in light of the SBA definition and the SBAR Panel's recommendations, we also sought comment on alternative definitions of a small refiner. Such alternatives included definitions based on volume of crude oil processed (at a given refinery and/or corporate-wide) or volume of gasoline produced, with the understanding that any relief offered to refiners must not substantially reduce the program's environmental benefits.

Our Revised Small Refiner Definition

Based on comments received on the proposal, we are making two changes to our definition of a small refiner: we are (1) revising the employee number criterion; and, (2) adopting a cap on the corporate crude oil capacity for a refining company to qualify as a small business under today's regulations.

In regard to the employee number criterion, we are modifying how the employee number is determined, based on comments received from SBA. As mentioned above, our proposed definition applied to any petroleum refining company having no more than 1,500 employees throughout the corporation as of January 1, 1999. We selected that date to prevent companies from ''gaming'' the system. However, as SBA pointed out in its comments, the Small Business Act regulations specify that, where the number of employees is used as a size standard, as we proposed for small refiners, size determination is based on the average number of employees for all pay periods during the preceding 12 months.

Since we intended to use SBA's size standard in our proposal, we are incorporating that definition correctly in today's action. It is also worth mentioning that SBA shares our concerns about preventing companies from gaming the system and that it solved this problem specifically by using the average employment over 12 months. In effect, this approach helps to prevent companies from applying for and receiving small refiner status in bad faith. An example of an inappropriate application for small refiner status would be a refiner that temporarily reduced its workforce from 1600 employees to 1495 employees immediately before January 1, 1999 and then immediately rehired those employees after that cutoff date. Furthermore, the averaging concept was designed to properly address firms with seasonal fluctuations, according to SBA.

Second, we're amending the small refiner definition to include a corporate crude oil capacity cap. We believe such a corporate volume limitation is necessary to ensure that only truly small businesses benefit from the relaxed interim standards. Refineries that process large amounts of crude are likely to be better able to install desulfurization equipment to meet the national standards in 2004. In addition to ensuring that the interim standards target the appropriate group of refiners that need additional time, the volume limit also serves to ensure that the volume of gasoline subject to such standards is not significant. In addition, we received many comments that we should adopt a threshold based on crude capacity as specified in the Clean Air Act and used in past EPA fuel programs.

In the lead phase-down program for gasoline, we used a definition of ''small refinery'' that Congress adopted in 1977 specifically for the lead phase-down program. The definition was based on crude oil or feedstock capacity at a particular refinery (less than or equal to 50,000 barrels per calendar day (bpcd)), combined with total crude oil or feed stock capacity of the refiner that owned the refinery (less than or equal to 137,500 bpcd). In 1990, the lead phase-down program was complete and Congress removed this provision from the Act.

Shortly before the Act was amended in 1990, we set standards for sulfur content in diesel fuel, including a two-year delay for small refineries. We used the same definition of small refinery as we used in the lead phase-down program. This two-year delay, like many of the small business flexibilities in our gasoline sulfur proposal, was aimed at problems that small refineries faced in raising capital and in arranging for refinery construction.

In the 1990 amendments to the Clean Air Act, Congress rejected this small refinery provision, and instead allocated allowances to small diesel refineries under the Title IV Acid Rain program. (See CAA Section 410(h).) This approach was also aimed at helping small refineries solve the problem of raising the capital needed to make investments to reduce diesel sulfur. Congress provided allowances to small refineries that met criteria similar to that used in the lead phase-down provision—based on the crude oil throughput at a particular refinery, combined with the total crude oil throughput of the refiner that owned the refinery.

As mentioned above, the CAA definition was based on crude oil or feedstock capacity at a particular refinery, combined with total crude oil or feed stock capacity of the refiner that owned the refinery (less than or equal to 137,500 bpcd). However, given the mergers, acquisitions, and other changes that have transpired throughout the refining industry in the past few years, we believe the appropriate boundary today is a corresponding corporate crude capacity less than or equal to 155,000 bpcd.

Therefore, in consideration of the above, a refiner must meet both of the following criteria to qualify for the special small refiner provisions described in the next section:

• No more than 1500 employees corporate-wide, based on the average number of employees for all pay periods from January 1, 1998 to January 1, 1999; and

• A corporate crude capacity less than or equal to 155,000 bpcd for 1998.

ii. Standards That Small Refiners Must Meet

Upon careful review of the comments received on the proposal as well as the recommendations of the SBAR Panel, we have determined that regulatory relief in the form of delayed compliance dates is appropriate to allow small refiners, both foreign and domestic, to comply with our regulations without disproportionate burdens. From 2004 to 2007, when U.S. refiners must meet the 30/80 standard or the standards listed in Table IV.C–1 if they are participating in our ABT program, refiners meeting the corporate employee and capacity limits prescribed above are allowed to comply with somewhat less stringent requirements. These interim annual-average standards for qualifying small refiners are shown in Table IV.C–3 below.

TABLE IV.C–3.—TEMPORARY GASOLINE SULFUR REQUIREMENTS FOR SMALL REFINERS IN 2004–2007

Refinery baseline sulfur level (ppm)	Temporary Sulfur Standards (ppm)	
	Average	Cap
0 to 30	30 ppm	300 ppm.
31 to 200	Baseline Level	300 ppm.
201 to 400	200 ppm	300 ppm.
401 to 600	50% of baseline	Factor of 1.5 times the average standard.
601 and above	300	450.

The cap standards for the first two ‘‘bins’’ of refineries (that is those with baseline sulfur levels from zero to 30 and 31 to 200) have been relaxed somewhat from the proposal based on comments that the proposed standards for these two bins were more stringent than the options under discussion for all other refiners. We believe that these small refiners should be able to meet the average standards without much, if any, change to their operations but the more lenient cap will give them some flexibility for turnarounds or unexpected equipment ‘‘upsets’’.

Compliance with the standards in Table IV.C–3 is based on a refiner's demonstration that it meets our specific small refiner criteria. Refiners who qualify as a small refiner under our definition must establish a sulfur baseline for each of their participating refineries. The following sections explain these requirements in more detail to supplement the information presented above. We also explain how small refiners can apply for an extension of up to two additional years of the applicable small refiner standards, based on a variety of factors such as technology availability or financial hardship.

iii. How Do Small Refiners Apply for Small Refiner Status?

Refiners seeking small refiner status under our gasoline sulfur program must apply to us in writing no later than December 31, 2000, requesting this status. This application for small refiner status must contain the information described below.

Companies[92] seeking small refiner status must provide us with the following information:

Employment Information

• A listing of the name and address of each location where any employee of the company worked during the 12 months preceding January 1, 1999.

• The average number of employees at each location based upon the number of employees for each of the company's pay periods for the 12 months preceding January 1, 1999.

• The type of business activities carried out at each location.

Crude Capacity Information

• The total corporate crude oil capacity of the refiner as reported to the Energy Information Administration (EIA) of the U.S. Department of Energy (DOE).

For refineries owned by joint ventures, the total employment of both (all) companies must be considered in determining whether the 1,500 employee limit is met. In addition, a refiner who reactivates a refinery that was shut down or non-operational between January 1, 1998 and January 1, 1999, may apply for small refiner status no later than June 1, 2002. In this case, we will consider the information provided to determine the correct period for judging compliance with the 1500 threshold. Where appropriate we will look at the most recent 12 months of employment information.

Refiners seeking small refiner status must also provide us with the total crude capacity of their corporation (the sum of all individual refinery capacities for multiple-refinery companies, including any and all subsidiaries) as reported to EIA for 1998 (published by EIA in 1999). The information submitted to EIA is presumed to be correct. However, in cases where a company disputes this information, we will allow 60 days after the company submits its application for small refiner status for that company to petition the Agency with the appropriate data to correct the record. For reactivated refineries owned by a small refiner, we will consider the information provided to determine the correct period for judging compliance with the corporate capacity threshold. Where appropriate, we will look at the most recent year of crude capacity information.

If a refiner with approved small refiner status later exceeds the 1,500 employee threshold without merger or acquisition or the corporate capacity of 155,000 bpcd, its refineries could keep their individual refinery standards. This is to avoid stifling normal company growth and is subject to our finding that the company did not apply for and receive the small refiner status in bad faith.

[92] Company means the business structure of the refinery whether privately or publicly owned.

iv. How Do Small Refineries Apply for a Sulfur Baseline?

A qualifying small refiner, domestic or foreign, may apply for an individual sulfur baseline by December 31, 2000 for any refinery owned by the company by providing the following information:

• A calculation of the refinery's sulfur baseline using its average gasoline sulfur level based on 1997 and 1998 production data, [93] and

• The average volume of gasoline (including conventional and reformulated) produced in these two years.

As we proposed, baseline sulfur levels and gasoline volumes are averaged over two years (1997 and 1998) to account for any production-related anomalies that may have occurred in 1997 or 1998. For the overall program, however, we are only using 1997 and 1998 data for the reasons described in Section IV.C.1, above. For any refiner who reactivates a refinery that was shut down or non-operational between January 1, 1998 and January 1, 1999, we will use the most recent information available for baseline establishment purposes.

The regulations specify the information to be submitted to support the baseline application. The baseline calculations should include any oxygen added to the gasoline at the refinery. This application would be submitted at the same time the refiner applies for small business status; confirmation of small business status would not be required to apply for an individual sulfur baseline. Pending refinery baseline approval, we will assign standards to each of the company's refineries in accordance with Table IV.C.–3.

Oxygenate blenders, regardless of their size, are not eligible for the small refiner individual baselines and standards because they would not experience circumstances similar to those of small refining companies. That is, oxygenate blenders do not have the burden of capital costs to install desulfurization equipment, which is the primary reason for allowing small refiners to have a relaxed compliance schedule.

v. Volume Limitation on Use of a Small Refinery Standard

Except as noted below, the volume of gasoline subject to a small refinery's individual standards is limited to the average volume of gasoline the refinery produced from crude oil during the baseline years (1997 and 1998), excluding the volume of gasoline produced using blendstocks produced at another refinery and exports.[94] Under this approach, the baseline volume for a small refinery would reflect only the volume of gasoline produced from crude oil during the 1997 and 1998 baseline years.

However, to ensure that the overall sulfur in gasoline from small refiners does not greatly increase under the terms of the small refiner extension and result in overall gasoline pool sulfur levels higher than anticipated, the volume would be limited beginning in 2004 to the volume of gasoline that is the lesser of: (1) 105 percent of the baseline volume, or (2) the volume of gasoline produced during the year from crude oil. Any volume of gasoline produced during an averaging period in excess of this limitation is subject to the corporate average standards that apply to all other refiners (*i.e.,* the corporate average standards listed in Table IV.C.–1).

In 2006 and 2007, the refinery averages of Table IV.C.–1 will apply. In this case, the small refinery's annual average standard will be adjusted based on the excess volume in a manner similar to the compliance baseline equation for conventional gasoline under Section 80.101(f) of Part 40 of the Code of Federal Regulations. However, the small refinery's per-gallon cap standard will not be adjusted.

This limitation assures that small refineries receive relief only for gasoline produced from crude oil, that is the portion of the refinery operation requiring capital investment to meet lower sulfur standards.

vi. Extensions Beyond 2007 for Small Refiners

Beginning January 1, 2008, all small companies' refineries must meet the national sulfur standard of 30 ppm on average and the 80 ppm cap, except small refineries under IV.C.2.i. that apply for and receive an extension of their small refiner status and unique standards. An extension will provide a given small refinery up to an additional two years to comply with the national standards. An extension must be requested in writing and must specify the factors that demonstrate a significant economic hardship to qualify the refinery for such an extension. Factors considered for an extension could include, but are not limited to, the refinery's financial position; its efforts to procure necessary equipment and to obtain design and engineering services and construction contractors; the availability of desulfurization equipment, and any other relevant factors.

In order for us to consider an extension, a refiner must submit a detailed request for an extension by January 1, 2007, demonstrating that it has made best efforts to obtain necessary financing, and must provide detailed information regarding any lack of success in obtaining financing. This information shall include, but may not be limited to copies of loan applications for the necessary financing for the construction of appropriate sulfur reduction technology as well as the application of financing for other equipment procurements or improvements in this time frame. If financing has been disapproved or is otherwise unsuccessful, the refiner shall provide documents supporting the basis for that disapproval and evidence of efforts to pursue other means of financing. If we determine that the refiner has made the best efforts possible to achieve compliance with the national standards by January 1, 2008, but has been unsuccessful for reasons beyond its control, we will consider granting the hardship extension initially for the 2008 averaging period. If further relief is appropriate for good reasons, we will consider a further extension through the 2009 averaging period but in no case will this relief be provided unless the refiner can demonstrate conclusively that it has financing in place and that it will be able to complete construction and meet the national gasoline sulfur standards no later than December 31, 2009.

Compliance Plans for Demonstrating a Commitment To Produce Low Sulfur Gasoline

This final rule includes a compliance plan provision for those refiners who may seek a hardship extension of their approved interim standards. This provision requires that those refiners with approved interim standards who seek a hardship extension must submit a series of reports to EPA discussing and describing their progress toward producing gasoline that meets the 30/80 ppm standards by January 1, 2008. We expect that small refiners will need to begin preparations to meet the national standards in 2008 by 2004. However, we understand that the potential exists for some small refiners to face additional hardship circumstances that will warrant more time to meet the standards. For this reason, we have adopted provisions (see above) allowing

[93] Includes batch number, volume, and sulfur content for each batch of gasoline produced in 1997 and 1998.

[94] In addition to gasoline produced from crude oil, a small refinery's baseline volume would include gasoline produced from purchased blendstocks where the blendstocks are substantially transformed using a refinery processing unit.

refiners subject to the interim standards to petition us and make a showing that additional time is needed to meet the national standards. To properly evaluate these hardship applications, we are requiring demonstrations of good faith efforts towards assessing the economic feasibility, along with the business and technical practicality of ultimately producing low sulfur gasoline. Such progress reports must be submitted for a refiner to receive consideration in any future determinations regarding hardship extensions. However, these reports are not required from refiners who will not be seeking a hardship extension.

By June 1, 2004, such refiners would need to submit preliminary information in the form of a report outlining its time line for compliance and a project plan discussing areas such as permits, engineering plans (*e.g.,* design and construction), and capital commitments for making the necessary modifications to produce low sulfur gasoline. Documents showing activities and progress in these areas should be provided if available.

By no later than June 1, 2005, these small refiners would need to submit a report to us stating in detail progress to date based on their time line and project plan. This should include copies of approved permits for construction of the equipment, contracts for design and construction, and any available evidence of having secured the necessary financing to complete the required construction. If any difficulties in meeting this requirement are anticipated, the refiner must submit a detailed report of all efforts to date and the factors that may cause delay, including costs, specification of engineering or other design work still needed and reasons for delay, specification of equipment needed and any reasons for delay, potential equipment suppliers and history of negotiations, and any other relevant information. If unavailability of equipment is a factor, the report must include a discussion of other options considered, and the reasons these other options are not feasible.

In addition, the small refiner would need to provide evidence by June 1, 2006, that on-site construction has begun at its refinery(s) and that absent unforeseen circumstances or problems, they will be producing complying gasoline (30/80 ppm) by January 1, 2008. While the submission of these progress reports is evidence of a refiner's good faith efforts to comply by 2008, it does not bind the refiner to make gasoline in 2008. There are several reasons why a refiner may choose to exit the gasoline-production business in 2008 that go beyond the low sulfur gasoline requirement.

As a result of a refiner's efforts in moving toward compliance with the 2008 standards, for market, economic, business, or technical reasons, the company could choose not to make gasoline in 2008. Although we do not believe this will be the likely outcome for small refiners, we cannot preclude it. Any refiner that makes such a determination in its progress reports will have until 2008 to transition out of gasoline production, but will not be considered for a extension of hardship relief.

vii. Can Small Refiners Participate in the ABT Program?

As described in IV.C.1.c.i above, any refinery (including those owned by small refiners) can generate sulfur allotments (in ppm-gallons) in 2003 by producing gasoline containing less than 60 ppm sulfur on an annual-average basis. Once this 60 ppm trigger is reached, allotments will be calculated based on the amount of reduction from 120 ppm [95]. However, these allotments may be discounted depending on the actual sulfur level. If a refinery fully demonstrates compliance by producing gasoline with an annual average sulfur level of 0 to 30 ppm, the allotments retain their full value—they are not discounted at all. For actual sulfur levels of 31–60 ppm, which are indicative of a partial demonstration, the allotments are discounted 20 percent.

During the period 2000–2003, refineries owned by small refiners can also generate credits by producing gasoline averaging at least 10 percent lower than that refinery's baseline sulfur level. In other words, to generate credits, the refinery's annual average sulfur level for all of its gasoline on average must be 0.9 × (baseline sulfur level). Once this ''trigger'' is reached, credits will be calculated based on the amount of reduction from the refinery's sulfur baseline. For example, if in 2002 a refinery reduced its annual average sulfur level from a baseline of 450 ppm to 150 ppm (well below the trigger of 0.9 × 450 = 405 ppm), its sulfur credits would be determined based on the difference in annual sulfur level (450—150 = 300 ppm) multiplied by the volume of gasoline produced in 2002. Similarly, small foreign refiner-owned refineries with an individual sulfur baseline can generate credits in these years as long as the annual average sulfur level of the gasoline exported to the U.S. from that refinery is lower than 90 percent of the baseline sulfur level.

During the period 2004–2007, refineries owned by small refiners will be permitted to generate credits but only if their actual annual sulfur level of all gasoline produced or imported averages below their refinery standard, and only for the difference between the standard and the actual annual sulfur average.

A refinery (owned by a small refiner) wishing to participate in the ABT program can sell credits beginning as soon as January 1, 2000 but may wait until December 31, 2000 to apply for small refiner status. However, the standards assigned to that refinery (as presented in Table IV.C–3 above) will be based on the sulfur level from which credits were generated, not the baseline sulfur level, since the refiner would have already demonstrated the ability to meet the lower sulfur level. For compliance purposes and to give refineries certainty regarding the gasoline sulfur standards to which they will be held during 2004–2007, the standards for a small refiner refinery participating in ABT will be set based on the refinery's lowest sulfur average for any year between 1999 and 2003.

Using the example above, a refinery (owned by a refiner with small refiner status) with a 1997–98 baseline sulfur level of 450 ppm would have an interim average standard of 450/2 = 225 ppm and a cap of 225 × 1.5 = 338 ppm. If that refinery generated 300 sulfur credits in 2002 by producing gasoline with 150 ppm sulfur, then that refinery's average sulfur standard for 2004–2007 would be ratcheted down to 150 ppm with a cap of 300 ppm. However, that refinery would still be able to use the 300 credits that it had generated and banked in 2002 for compliance with its 150 ppm standard.

Based on the comments received on our proposal, we are allowing small refineries to use credits and/or allotments that they generated and/or to purchase credits and/or allotments from another refinery to meet their average standard during 2004–2007. We solicited comment on whether small refiners subject to the interim standards should be permitted to use credits towards meeting those standards, and several small refiners who already produce very clean gasoline commented that the special small refiner standards do not benefit them in any way. These refiners argued that if they could generate sufficient sulfur credits in 2000–2003, or could obtain such credits

[95] If a refinery has a baseline sulfur level higher than 120 ppm (as described below in IV.C.1.c.v.), then credits are generated from the baseline to 120 ppm and allotments from 120 ppm to the new sulfur level (and discounted 20 percent if applicable).

through purchases from other refiners, they would not participate in the small refiner program but would instead participate in the sulfur ABT program. But since they are not positioned to generate credits (due to their already low sulfur levels), and have little certainty of being able to purchase credits, they need the relief provided by the small refiner provisions. We concur with these concerns and thus permit small refiners to use ABT credits and allotments. Small refiners may only use ABT credits and/or allotments to comply with their refinery average standard, not the per-gallon caps applied to their gasoline.

At any time, a small refiner can choose to ''opt out'' of the small refiner program and, beginning the next calendar year, comply with the standards in Table IV.C–2. The refiner would have to notify us of this change in its compliance program. Once a small refiner leaves the small refiner program, however, it would not be eligible to re-enter the small refiner program.

b. Temporary Waivers From Low Sulfur Requirements in Extreme Unforeseen Circumstances

In the final rule, EPA is adopting a provision permitting refiners to seek a temporary waiver from the sulfur standards in certain circumstances. Such waivers will be granted at EPA's discretion. Under this provision a refiner may seek permission to distribute gasoline that does not meet the applicable low sulfur standards for a brief time period, based on the refiner's inability to produce complying gasoline because of extreme and unusual circumstances outside the refiner's control that could not have been avoided through the exercise of due diligence. This provision is similar to a provision in EPA's RFG regulations, and is intended to provide refiners short-term relief in unanticipated circumstances such as an accidental refinery fire or a natural disaster. The short-term waiver provision is intended to address unanticipated circumstances that cannot be reasonably foreseen at this time or in the near future

The conditions for obtaining such a waiver that are similar to those in the RFG regulations. These conditions are necessary and appropriate to ensure that any waivers that are granted are limited in scope, and that refiners do not gain economic benefits from a waiver. Therefore, refiners seeking a waiver must show that the waiver is in the public interest, that the refiner was not able to avoid the nonconformity, that it will make up the air quality detriment associated with the waiver, as well as any economic benefit from the waiver, and that it will meet the applicable sulfur standards as expeditiously as possible.

c. Temporary Waivers Based on Extreme Hardship Circumstances

In addition to the provision for short-term relief in unanticipated circumstances, we are adopting a provision for relief based on extreme hardship circumstances. In developing our sulfur program, we considered whether any refiners would face particular difficulty in complying with the standards in the lead time provided. As described in Section IV.C.2.a., we concluded that refineries owned by small businesses would experience more difficulty in complying with the standards on time because, as a group, they have less ability to raise capital necessary for refinery investments, face proportionately higher costs because of economies of scale, and are less able to successfully compete for limited engineering and construction resources. However, it is possible that other refiners who do not meet our criteria for the interim standards also face particular difficulty in complying with the sulfur standards on time. Therefore, we are including in the final rule a provision allowing us, at our discretion, to grant temporary waivers from the sulfur standards based on a showing of extreme hardship circumstances. We do not anticipate, nor do we expect there is a need for, granting temporary waivers that apply to more than approximately one percent of the national gasoline pool in any given year. This provision would allow refiners (domestic and foreign) to request a waiver from the sulfur standards based on a showing of unusual circumstances that result in extreme hardship and significantly affect the ability to comply by the applicable date. As with the small refiner interim standards, this provision furthers our overall environmental goals of achieving low sulfur gasoline nationwide as soon as possible. By providing short-term relief to those refiners that need additional time because they face hardship circumstances, we can adopt a program that reduces gasoline sulfur beginning in 2004 for the majority of the industry that can comply by then.

As described above, EPA understands that this program will require significant economic investments by the refining industry. We have adopted a program with sufficient flexibilities (including an ABT program, allotment trading, a geographic phase-in, and interim standards for qualifying small refiners) to make these investments reasonable and feasible over the time frame in which the standards are phased in. Because the refining industry encompasses a wide variety of individual circumstances, and our program phases in based on the lead time we believe is reasonable for the industry as a whole, there may be unusual circumstances that impose extreme hardship and significantly affect an individual refinery's ability to comply in the lead time provided. However, we do not intend for this waiver provision to encourage refiners to delay planning and investments they would otherwise make in anticipation of receiving relief from the applicable requirements. In addition, we want to limit the environmental impact of any hardship waivers from compliance with the standards. Thus, we anticipate that hardship waivers will only be granted in rare circumstances.

Because of the significant environmental benefits of lowering sulfur in gasoline, we will administer this provision in a manner consistent with continuing to ensure the environmental objectives of the regulation. In our analysis of the interim small refiner standards, we concluded that only a minimal portion of the national gasoline pool would potentially be impacted by the less stringent interim standards, due to the relatively small production volume of these facilities. To limit the potential environmental impact of this hardship provision, we reserve the discretion to deny applications where we find that granting a waiver would result in an unacceptable environmental impact. While this determination will be made on a case-by-case basis, we do not expect there is a need for, nor do we anticipate, granting waivers that apply to more than approximately one percent of the total national pool of gasoline in any given year, or to more than a minimal percentage of the gasoline supply of an area known to have significant air quality problems.

There are several factors we will consider in evaluating a petition for additional time to comply. This could include refinery configuration, severe economic limitations, and other factors that prevent compliance in the lead time provided. Applications for a waiver must include information that will allow us to evaluate all appropriate factors. EPA will consider whether the refinery configuration or operation is unique or atypical, how much of a refinery's gasoline is produced using an FCC unit, its hydrotreating capacity relative to its total crude capacity, total reformer unit throughput capacity relative to total production, gasoline production in proportion to other refinery products, and other relevant factors. A refiner may also face severe economic limitations that result in a demonstrated inability to raise capital to make necessary investments to comply in time, which can be shown by an unfavorable bond rating, inadequate resources of the refiner and its parent and/or subsidiaries, or other relevant factors. In addition, we will look at the total crude capacity of the refinery and its parent corporation. Finally, we will consider where the gasoline will be sold in evaluating the environmental impacts of granting a waiver.

This provision is intended to address unusual circumstances that we expect will be foreseeable now or in the immediate future, such as unique and atypical gasoline refinery operations or a demonstrated inability to raise capital. These kinds of circumstances should be apparent at this time or in the near future, so refiners seeking additional time under this provision must apply for relief by September 1, 2000. A refiner seeking a waiver must show that unusual circumstances exist that impose extreme hardship and significantly affect its ability to meet the standards on time, and that it has made best efforts to comply with the standards, including efforts to obtain credits and/or allotments towards compliance. Applicants for a hardship waiver must also submit a plan demonstrating how the standards will be achieved as expeditiously as possible. In submitting the plan, it must include a timetable for obtaining the necessary capital, contracting for engineering and construction resources, and obtaining permits. EPA will review and act on applications, and, if a waiver is granted, will specify a time period, not to extend beyond January 1, 2008 (the date by which all gasoline is expected to meet the 30 ppm refinery average and 80 ppm per gallon cap standards), for the waiver.

If a waiver is granted, EPA will impose as a condition of the waiver other reasonable requirements, including antibacksliding requirements to ensure no deterioration in the sulfur level of gasoline and interim sulfur standards that the refiner must meet. This is appropriate since some refiners who may qualify for a waiver can achieve some sulfur reductions, and even reductions to levels above 30 ppm will result in some environmental benefits. While this provision allows EPA to waive the per gallon standards as well as the average standards, EPA would not allow gasoline sulfur to exceed the highest per gallon cap applicable to a refiner under the interim small refiner standards described in Section IV.C.2. Once all applications have been received, EPA will consider the appropriate process to follow in reviewing and acting on applications, including whether to conduct a notice and comment decision-making process.

3. Streamlining of Refinery Air Pollution Permitting Process

a. Brief Summary of Proposal

Industry commenters expressed concern over the ability to obtain permits to construct and operate the facility modifications needed to meet the Tier 2 rule requirements by the end of 2004. As part of the preamble to the proposed rule, we outlined possible approaches to provide greater certainty and to expedite potentially applicable permit processes. In general, we solicited comments on whether and how policy options might be designed so as to exempt Tier 2 projects from major New Source Review (NSR) and/or to expedite the processing of permits where such requirements would apply. In particular, we solicited comment on whether the major NSR process could be expedited if: (1) EPA provided guidance on Lowest Achievable Emission Rate (LAER) requirements or Best Available Control Technology (BACT) determinations; (2) emissions reductions could be made available or designated for offsetting Tier 2 activities; (3) EPA developed model permits, or (4) EPA assisted the States in resolving source-specific permitting issues as they would arise. The Agency also solicited comments on how the title V operating permit requirements, where applicable, might need to be integrated with the relevant NSR process.

In proposing various mechanisms to expedite the permitting of Tier 2 projects, we recognized that a combination of measures might be needed, since the situations could vary widely among individual refineries due to differences in such factors as available equipment capacity, amount of sulfur in the crude oil, and applicable State regulations. Source-specific analyses are also necessary to establish what sulfur reduction techniques can be applied, to determine the applicable permitting requirements, and to evaluate what controls will be necessary as a result of these requirements. We indicated our intent to offer assistance where needed.

b. Significant Comments Received

The most significant comments received on the proposal concerning the timing impacts due to air permit requirements are presented below. These commenters focused exclusively on the requirements to obtain a preconstruction permit under the NSR program. Generally, commenters only concerns regarding the title V operating permit program were that the States' ongoing efforts to issue these permits might create a backlog which could delay the issuance of NSR permits for Tier 2 projects. A more detailed discussion of comments received on the proposal and EPA's response are contained in the Response To Comments document and is filed in the Docket for this action.

We received written and oral comments from refineries about the permit requirements associated with Tier 2 projects. Refiners emphasized the need for certainty. They pointed out the need to secure preconstruction permits within 18 months (*e.g.,* 6 months to prepare and file NSR applications and another 12 months to issue the permit) and the need for permitting authorities to commit appropriate resources to meet this time frame. State and local air pollution control agencies did not support providing exemptions from emissions control and permitting requirements. Rather, agency commenters stated that they could accomplish the permitting requirements in the necessary time frames, provided that complete permit applications were received in a timely manner and refiners conferred with their regulatory agencies soon after the Tier 2 requirements are promulgated. They also indicated that the major NSR process could be expedited and have more certainty (i.e., permits could be processed in 6 to 9 months) if EPA would provide guidance on emissions controls, emissions monitoring, and offsets. In general, environmental and community groups pointed out that the remedies under traditional permitting practices should be exhausted before additional flexibility is granted for Tier 2 projects.

c. Today's Action

Based on the comments and other information received in response to the proposal, EPA believes that it is not necessary or appropriate to explore further the development of possible options which would exempt Tier 2 projects from the normally applicable preconstruction review process. This position is supported by: (1) The comments of States that industry can, in general, apply and receive NSR permits in time to comply with Tier 2; and (2) the recognition of industry's potential ability to use emissions reductions to net Tier 2 projects out of major NSR which would otherwise be applicable. Nonetheless, we believe that actions should be taken to facilitate early compliance, to add certainty to the anticipated permitting actions and schedules, and to minimize the possibility of delay. Accordingly, EPA is taking two types of actions to promote these objectives.

First, as previously discussed, we have structured the final gasoline sulfur program to allow additional lead time for many refiners (i.e., certain refineries would be able to make desulfurization changes later than the proposed 2004 compliance date to meet Tier 2 requirements). This approach will help address the concerns over the availability of necessary new equipment and permitting backlogs caused by many refineries acting to obtain permits and order equipment within relatively the same time period.

Second, we intend to take several actions (described in more detail below) to expedite and impart greater certainty in obtaining necessary major NSR permits. As a result of comments received on the proposal, and the lead time provided in the final gasoline sulfur program, we believe that the vast majority of permits can be issued within the necessary time frames, provided that refineries submit their preconstruction applications in a timely manner and regulatory authorities prioritize the issuance of these permits. We also intend to assist States and refiners on a case-by-case basis in their efforts to address any unique permitting problems that might arise and, thus, remedy potential problems that could cause unanticipated delays. In the unlikely event permitting delays occur, EPA will work with refiners and the state/local permitting agencies on a case-by-case basis, where a refinery has unique circumstances that necessitate unique treatment.

While today's strategy will help expedite the permitting process, refineries that trigger major NSR as a result of producing low sulfur gasoline will still have to install the stringent level of emissions control technology required by the Act. However, we intend to issue guidance to assist states in making decisions about the levels of control technology, as described more below. In addition, the Agency wishes to clarify that, in our efforts to provide greater certainty and to facilitate more expeditious permitting, we are in no way shortcutting existing opportunities for public participation. We recognize the importance of public participation in making permitting decisions and intend that the measures adopted to address permitting concerns will not diminish the opportunities for public participation.

i. Major New Source Review

The major NSR program, as it applies to existing major stationary sources of air pollution, requires that a preconstruction permit be issued before a source makes a physical change or change in its method of operation of any project that would result in a significant net emissions increase. As described in the proposal, the steps taken by certain refineries to implement gasoline sulfur reductions to meet today's rule could result in emissions increases in one or more pollutants which may trigger the requirements for this type of preconstruction permit. A number of the refineries are located in areas designated as nonattainment for at least one pollutant. The nonattainment NSR requirements pursuant to part D of the Act would apply to any such refinery undergoing a major modification. For those refineries located in attainment or unclassifiable areas, permit requirements for the prevention of significant deterioration (PSD) of air quality must be met for major modifications.

The EPA recognizes the importance of timely major NSR (as applicable) permit actions for refineries to proceed with necessary changes to meet the new low sulfur gasoline standard. We encourage refineries to begin discussions with permitting authorities and to submit permit applications—as early as possible. In addition, based on comments received, we believe that there are a few key areas in which assistance would be useful toward helping States issue timely permits to the applicable refineries:

• *Federal guidance on emissions control technology requirements.*

Refineries subject to major NSR review will be required to undergo a source-specific evaluation to apply either BACT or LAER, depending upon the applicable program requirements. For example, the evaluation for BACT is case-by-case and takes into account the alternative technologies available to control pollution from a particular emissions unit or process, and considers the energy, environmental, economic and other costs associated with each technology. We intend to issue guidance setting out a level of emissions that, in our view, would be expected to satisfy the requirements for BACT for certain emissions units associated with refinery desulfurization projects. While States would not be required to use the results to establish BACT for a particular refinery subject to review and EPA's guidance on a control technology may not be appropriate where there exists unusual site-specific circumstances, such guidance would add the certainty of EPA's expectations.

Since negotiation of an appropriate BACT level often is one of the most time consuming aspects of permitting, we believe this EPA guidance will significantly expedite the process. The federal guidance on BACT, by including an evaluation of the most stringent control levels currently being achieved or required, will also provide federal guidance on LAER. The EPA plans to make a draft of this guidance available for public review and comment in January 2000. Final guidance would then be prepared, after relevant comments are considered, in time for States, refiners, and the public to consider in preparing and reviewing permit applications and proposed permits.

• *Availability of offsets.*

Refineries located in nonattainment areas must offset any proposed significant emissions increases with an equal or greater amount of emissions reductions from other sources, usually coming from within the same nonattainment area. We believe that vehicle emissions reductions resulting from the use of low sulfur gasoline can be used as offsets for the refineries, as long as the statutory and regulatory criteria for creditable offsets are satisfied and States decide to provide for this opportunity in their SIP attainment demonstration. We believe generally that this option should be available to States since only a small fraction of the total vehicle emissions reductions in any county would be needed to offset refinery emissions increases resulting from implementation of gasoline desulfurization projects. Generally, the reductions must also occur in the same nonattainment area as the location of the refinery for which the offsets are required. The EPA plans to issue the appropriate guidance early in the year 2000 to help a State to determine whether and to what extent it may wish to use vehicle emissions reductions as offsets for Tier 2 projects.

• EPA refinery permitting teams.

We intend to assemble special EPA teams, comprised of Headquarters and Regional Office experts, that will track the overall progress in permit issuance and will be available to assist State and local permitting authorities, refineries, and the public upon request to resolve site-specific permitting issues. These teams will be comprised of persons who are knowledgeable about permitting programs and refinery operations and can provide expert assistance to troubleshoot permitting issues that may arise. As appropriate, the teams will work with stakeholders on a case-by-case basis to evaluate site-specific approaches to regulatory compliance within existing policy and regulations.

ii. Environmental Justice

The Tier 2/gasoline sulfur rule will help achieve significant nationwide reductions in the emissions of nitrogen oxides (NOx), volatile organic compounds (VOC), particulate matter (PM), and sulfur dioxide (SO_2). These reductions will improve air quality across the country and will provide increased protection to the public against a wide range of health effects, including chronic bronchitis, respiratory illnesses, and aggravation of asthma symptoms. Furthermore, the Tier 2/gasoline sulfur rule will achieve environmental benefits in the local areas where refineries are located, due to reductions in tail pipe emissions from vehicles driven in those areas. Although we expect residual emissions increases at some refineries even after installing the stringent level of emissions controls required under the Act, for the vast majority of areas, we believe that these potential refinery emissions increases will be very small compared to the Tier 2 benefits in those same local areas.

We believe it is important to understand and address concerns relating to potential localized emissions increases from refineries that make significant process changes to meet the requirements of the Tier 2 rule. We believe that, among other things, the keys to addressing any potential concerns are as follows:

- Providing meaningful community involvement early and throughout the process;
- Determining what information and actions would eliminate concerns; and
- Determining what EPA, States, and industry can do to make the permitting process smoother by ensuring ongoing community involvement in the decision making process and by building trust among stakeholders.

To this end, the Agency has already taken some actions to try to mitigate potential environmental justice concerns. First, EPA's Office of Air and Radiation and the Alternative Dispute Resolution Team within EPA's Office of the Administrator implemented a national convening process which was designed to bring together a broad spectrum of stakeholders to explore with them their perceptions and views of issues associated with Tier 2 permitting and to assess the potential for a collaborative process to address specific implementation issues at some time in the future. The convening was carried out by an outside neutral party who conducted interviews with representatives from selected EPA offices, States, industry, environmental groups, and environmental justice organizations. Second, EPA held informational briefings and provided background materials to the National Environmental Justice Advisory Council's (NEJAC) [96] Air and Water Subcommittee and Enforcement Subcommittee to provide an opportunity for them to provide feedback and recommendations to the Agency. Finally, in October 1999, we met with both national environmental groups and environmental justice advocacy representatives, to discuss their views on the permitting aspects of the proposed rule.

The EPA is committed to continue working with all stakeholders to resolve specific Environmental Justice issues if and when they arise. To fulfill this commitment, we plan to undertake additional actions in the future, including providing education and outreach about the rule and its impacts in local communities, developing permitting guidance through a public process and addressing Title VI petitions if they arise.

D. What Are the Economic Impacts, Cost Effectiveness and Monetized Benefits of the Tier 2 Program?

Consideration of the economic impacts of new standards for vehicles and fuels has been an important part of our decision making process for this final rule. The following sections describe first the costs associated with meeting the new vehicle standards and the new fuel standards. This will be followed with a discussion of the cost effectiveness of the rule. Lastly, we will discuss the results of a benefit-cost assessment that we have prepared.

Full details of our cost analyses, including information not presented here, can be found in the RIA associated with this rule. Also, our response to comments on the cost, cost effectiveness, and monetized benefits analyses are contained in the Response to Comments document for this rule.

1. What Are the Estimated Costs of the Vehicle Standards?

To perform a cost analysis for the standards, we first determined a package of likely technologies that manufacturers could use to meet the standards and then determined the costs of those technologies. In making our estimates we have relied on our own technology assessment which included publicly available information, such as that developed by California, as well as confidential information supplied by individual manufacturers, and the results of our own in-house testing.

In general, we expect that the Tier 2 standards will be met through refinements of current emissions control components and systems rather than through the widespread use of new technology. Furthermore, smaller lighter-weight vehicles and trucks will generally require less extensive improvements than larger vehicles and trucks. More specifically, we anticipate a combination of technology upgrades such as the following:

- Improvements to the catalyst system design, structure, and formulation plus in some cases an increase in average catalyst size and loading;
- Air and fuel system modifications including changes such as improved microprocessors, improved oxygen sensors, leak free exhaust systems, air assisted fuel injection, and calibration changes including improved precision fuel control and individual cylinder fuel control;
- Engine modifications, possibly including an additional spark plug per cylinder, an additional swirl control valve, or other hardware changes needed to achieve cold combustion stability;
- Increased use of fully electronic exhaust gas recirculation (EGR); and
- Increased use of secondary air injection for 6 cylinder and larger engines.

The costs for MDPVs have been included here with the LDT4 cost estimates. We expect that the technologies needed to meet the Tier 2 standards for the MDPVs will be very similar to those for LDT4s. However, the MDPVs cost estimates are somewhat higher than for LDT4s. Vehicles over 8,500 pounds GVWR are currently certified to heavy-duty engine emissions standards using the heavy-duty test procedures. This, at least in part, has led to differences in baseline technologies compared to current LDT4s. Vehicles above 8,500 pounds, for example, are currently equipped with technologies such as close coupled catalysts and secondary air injection to a lesser extent. Therefore, we expect higher incremental costs for the MDPVs compared to LDT4s. There is further information on the costs for MDPVs in the RIA.

[96] The NEJAC was chartered in 1993 expressly to give the EPA Administrator independent advice, consultation, and recommendations on environmental justice matters. NEJAC members come from state, tribal, and local governments; tribal and indigenous citizen's organizations; business and industry; academia; and environmental advocacy and grassroots community groups.

Using a typical mix of changes for each group, we projected costs separately for LDVs, the different LDT classes, and for different engine sizes (4, 6, 8, 10-cylinder) within each class. For each group we developed estimates of both variable costs (for hardware and assembly time) and fixed costs (for R&D, retooling, and certification).

Cost estimates based on the current projected costs for our estimated technology packages represent an expected incremental cost of vehicles in the near-term. For the longer term, we have identified factors that would cause cost impacts to decrease over time. First, since fixed costs are assumed to be recovered over a five-year period, these costs disappear from the analysis after the fifth model year of production. Second, the analysis incorporates the expectation that manufacturers and suppliers will apply ongoing research and manufacturing innovation to making emission controls more effective and less costly over time. Research in the costs of manufacturing has consistently shown that as manufacturers gain experience in production and use, they are able to apply innovations to simplify machining and assembly operations, use lower cost materials, and reduce the number or complexity of component parts.[97] These reductions in production costs are typically associated with every doubling of production volume. Our analysis incorporates the effects of this ''learning curve'' by projecting that the variable costs of producing the Tier 2 vehicles decreases by 20 percent starting with the third year of production. We applied the learning curve reduction only once since, with existing technologies, there would be less opportunity for lowering production costs than would be the case with the adoption of new technology.

We have prepared our cost estimates for meeting the Tier 2 standards using a baseline of NLEV technologies for LDVs, LDT1s, and LDT2s, and Tier 1, or current technologies for LDT3s, LDT4s and MDPVs. These are the standards that vehicles would be meeting in 2003.[98] We have not specifically analyzed smaller incremental changes to technologies that might occur due to the interim standards between the baseline and Tier 2. In most cases, we believe these changes will not be significant based on current certification levels and manufacturers will maximize carry-over. For others, manufacturers can use averaging and other program flexibilities to avoid redesigning vehicles twice within a relatively short period of time. We believe this is likely to be an attractive approach for manufacturers due to the savings in R&D and other resources.

For the total annual cost estimates, we projected that manufacturers will start the phase-in of Tier 2 vehicles with LDVs in 2004 and progress to heavier vehicles until all LDT2s meet Tier 2 standards in 2007. For LDT3s and LDT4s, we projected some sales of Tier 2 LDT3s prior to 2008 for purposes of averaging in the interim program and that the phase-in of Tier 2 vehicles would end with LDT4s and MDPVs in 2009.

Finally, we have incorporated what we believe to be a conservatively high level of R&D spending at $5,000,000 per vehicle line (with annual sales of 100,000 units per line). We have included this large R&D effort because calibration and system optimization is likely to be a critical part of the effort to meet Tier 2 standards. However, we believe that the R&D costs may be generous because the projection ignores the carryover of knowledge from the first vehicle lines designed to meet the standard to others phased-in later.

The evaporative emissions standards we are finalizing today for LDVs, LDTs and MDPVs are feasible with relatively small cost impacts. We estimate the cost of system improvements to be about $4 per vehicle, for all vehicle classes. This incremental cost reflects the cost of moving to low permeability materials, improved designs or low-loss connectors. R&D for the evaporative emissions standard is included in the R&D estimates given above for the tailpipe standards. We have included no projections of learning curve reductions for the evaporative standard.

Table IV.D.–1 provides our estimates of the per vehicle increase in purchase price for LDVs, LDTs, and MDPVs. The near-term cost estimates in Table IV.D.–1 are for the first years that vehicles meeting the standards are sold, prior to cost reductions due to lower productions costs and the retirement of fixed costs. The long-term projections take these cost reductions into account. We have sales weighted the cost differences for the various engine sizes (4-, 6-, 8-, 10-cylinder) within each category.

TABLE IV.D.–1.—ESTIMATED PURCHASE PRICE INCREASES DUE TO TIER 2 TAILPIPE STANDARDS

	LDV	LDT1	LDT2	LDT3	LDT4/ MDPVs[a]
Tailpipe standards:					
Near-term (year 1)	$78	$70	$125	$245	$258
Long-term (year 6 and beyond)	49	45	97	199	208
Evaporative Standard	4	4	4	4	4

Notes:
[a] Weighted average.

We did not receive comments disagreeing with the technology projections or technology cost estimates contained in the proposal. We have, however, revised our cost estimates somewhat based on new information available since the proposal. We moderately lowered our cost estimates due to adjustments we have made in our technology projections. Based on the results of our vehicle testing program described above in section IV.A.1., we now believe that a few of the hardware changes we had anticipated are not likely to be needed to meet the standards. Albeit there is always fluctuation, the spot prices of precious metals have increased somewhat since the proposal and we have adjusted our analysis to reflect those changes.

Overall, the cost estimates are within 5 percent of those in the proposal for LDVs and LLDTs. The changes noted above moderately lowered the costs for HLDTs compared to the proposal. The cost increase due to the inclusion of MDPVs offsets most of the lowered costs

[97] ''Learning Curves in Manufacturing,'' Linda Argote and Dennis Epple, Science, February 23, 1990, Vol. 247, pp. 920–924.

[98] Even though the NLEV program ends in the Tier 2 timeframe, we have not included the NLEV program costs or benefits in our analysis, since EPA analyzed and adopted NLEV previously.

for the LDT4 category. The resulting cost estimate for the LDT4/MDPVs tailpipe standards is also within 5 percent of the cost estimates for LDT4s contained in the proposal. The detailed technology and cost analyses are available in the RIA.

We are also finalizing OBD II requirements and onboard vapor recovery (ORVR) requirements for MDPVs. We have estimated that OBD II will cost about $80, which includes the costs of additional sensors and system improvements. We have estimated ORVR system costs to be about $10. The $10 cost for ORVR does not include any fuel cost savings over the life of the vehicles due the recover of fuel vapor during refueling. ORVR provides a fuel cost savings because the vapors are captured, and burned in the engine, rather than escaping to the atmosphere. We estimate the savings over the life of the vehicle to be about $6. These costs are not reflected in Table IV.D.–1.

2. Estimated Costs of the Gasoline Sulfur Standards

As we explained at the beginning of Section IV.C, we expect that most refiners will have to install capital equipment to meet the gasoline sulfur standard. Presuming that refiners will want to minimize the cost involved, the majority of refiners are expected to desulfurize the gasoline blendstock produced by the fluidized catalytic cracker (FCC) unit, although a few may choose to desulfurize the feed to the FCC unit. Recent advances have led to significant improvements in the hydrotreating technologies used for FCC gasoline desulfurization. Since these improved technologies represent the lowest cost options and are expected to be used by most refiners needing to install desulfurization equipment, we have based our cost estimates primarily on their use. However, in acknowledgment that some refiners, particularly those which make investment decisions in the near term, are likely to select more traditional approaches using proven technologies, we have included the costs for currently proven desulfurization technologies in our analysis, as well. This is different from the analysis we did in support of our proposal, where we assumed that all refiners would take advantage of the most improved technologies we were aware of at that time.

For our analysis of the costs of controlling gasoline sulfur, we estimated the costs in five different regions of the country (Petroleum Administration Districts for Defense, or PADDs) for reductions from the current PADD average gasoline sulfur level down to a 30 ppm average. We then combined the regional costs to develop an average national individual refinery cost, and used this figure to calculate national aggregate capital and operating costs. In our proposal we estimated a single cost for desulfurizing gasoline, using as an assumption for the purpose of analysis that all refiners would upgrade their refineries by 2004 and that all would choose one of two improved technologies we knew of at the time. We then reduced this cost over time to reflect expected cost reductions due to further technology advancements and reduced operating costs due to improved understanding of the technologies and refinery debottlenecking. Based on improved information about the availability of technologies, we have now analyzed the costs of controlling sulfur on a year-by-year basis beginning with 2004, to be consistent with our analysis of the rate at which the industry would invest in desulfurization technologies over the first years of the program and the changing technology selections (and costs) that would accompany this phase-in (discussed in Section IV.C.1 above). A detailed description of our calculations can be found in the Regulatory Impact Analysis; the reader can refer to the draft RIA released with the proposed rule for more information on our prior analysis.

We estimate that, on average, refineries which install equipment to meet the 30 ppm average standard will invest about $44 million for capital equipment and spend about $16 million per year for each refinery to cover the operating costs associated with these desulfurization units. Since this average represents many refineries diverse in size and gasoline sulfur level as well as a mix of desulfurization technologies, some refineries will pay more and others less than the average costs. When the average per-refinery cost is aggregated for all the gasoline expected to be produced in this country in 2008 (the first year that all refiners will be required to meet the 30 ppm standard, unless any small refiners are granted a extension of hardship relief), the total investment for desulfurization processing units (spread between 2003 and 2007) is estimated to be about $4.3 billion, and operating costs for these units is expected to be about $1.3 billion per year.

Using our estimated capital and operating costs for domestic refineries, we calculated the average per-gallon cost of reducing gasoline sulfur down to 30 ppm for each year as the program is implemented. Using a capital cost amortization factor (based on a seven percent rate of return on investment) and including no taxes, we estimated the average national cost for desulfurizing gasoline to be about 1.7–1.9 cents per gallon as the program is phased in. This cost is the cost to society of reducing gasoline sulfur down to 30 ppm that we used for estimating cost effectiveness. Table IV.D.–2 below summarizes our estimates of per-gallon gasoline cost increases for select years.

TABLE IV.D.–2.—ESTIMATED PER-GALLON COST FOR DESULFURIZING GASOLINE IN FUTURE YEARS

Year	Cost (cents/gallon)
2004	1.9
2005	1.9
2006	1.7
2007	1.7
2008–2018	1.7
2019+	1.3

Although the costs shown here are slightly higher than we projected in the proposal, overall, we believe our revised costs are consistent with those in the proposal and that our improved methodology and information are the source of the differences. As stated earlier in this section, we believe this analysis more accurately reflects the actual investment decisions of individual refiners over the years in which the industry is phasing down sulfur levels. Furthermore, we have also made a number of other adjustments to our analysis of capital and operating costs for each individual technology based on new information received from the technology vendors and information we obtained during the comment period. For example, we now include eight different technologies in our analysis, including some more traditional approaches, whereas in the proposal we only considered two new technologies. Hence, the range of costs is broader. In addition, as explained in the RIA, we now believe we underestimated the capital costs of desulfurization slightly in the proposal based on our calculation of the costs of providing hydrogen to the processes. We believe our analysis now reflects the most up-to-date information about the costs of installing and operating the various desulfurization technologies included in our analysis. These adjustments are explained in detail in the Regulatory Impact Analysis.

We still believe that over time, particularly in 2006–8 when the last refineries will be making investments, the costs of gasoline desulfurization equipment will be significantly lower than it is today. Some of the technologies expected to be selected in this time frame (specifically, the new adsorption technologies which we didn't know about when we proposed these requirements) are projected to cost about half of what the older technologies cost. Furthermore, with time refiners will have to replace existing desulfurization equipment (as equipment ages), and by then they will have a number of low cost alternatives to choose from. Thus, as Table IV.D.–2 shows, the long term estimated costs for gasoline desulfurization are lower than those we projected in our proposal.[99]

3. What Are the Aggregate Costs of the Tier 2/Gasoline Sulfur Final Rule?

Using current data for the size and characteristics of the vehicle fleet and making projections for the future, the per-vehicle and per-gallon fuel costs described above can be used to estimate the total cost to the nation for the emission standards in any year. Figure IV.D.–1 portrays the results of these projections.[100]

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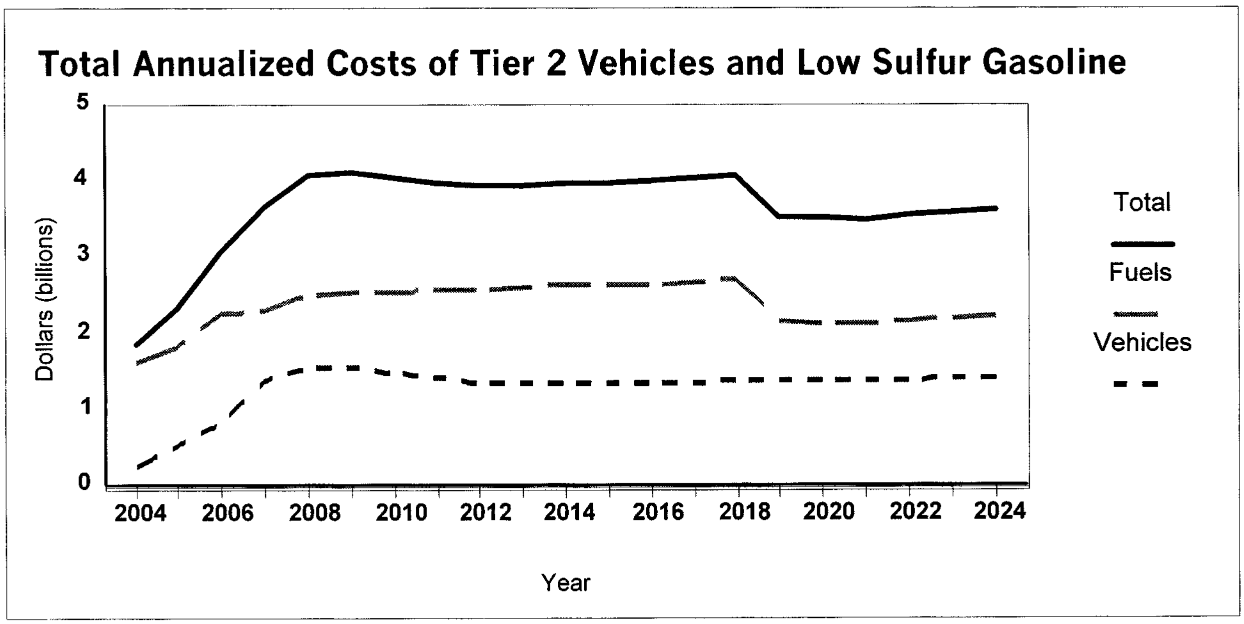
Figure IV.D. -1



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As can be seen from the figure, the annual cost starts out at about $1.9 billion per year and increases over the phase-in period to about $4.1 billion in 2008. Total annualized costs are projected to remain at about $4 billion through 2018. After 2018, annualized fuel costs are projected to decrease somewhat due to the use of new technologies which would enable refiners to produce low sulfur fuel at a lower cost. The gradual rise in costs long term is due to the effects of projected growth in vehicle sales and fuel consumption. The RIA provides further detail regarding these cost projections.

4. How Does the Cost-effectiveness of This Program Compare to Other Programs?

This section summarizes the cost-effectiveness analysis conducted by EPA and its results. The purpose of this analysis is to show that the reductions from the vehicle and fuel controls being finalized today are cost-effective in comparison to alternative means of attaining or maintaining the NAAQS. This analysis involves a comparison of our program not only to past measures, but also to other potential future measures that might be employed to attain and maintain the NAAQS. Both EPA and states have already adopted numerous control measures, and remaining measures tend to be more expensive than those previously employed. As we employ the most cost-effective available measures first, more expensive ones tend to become necessary over time.

The emission reductions used to calculate the cost-effectiveness levels reported here are based on those reductions used for our air quality analysis modeling and benefits analysis. This was done to maintain consistency in the analyses. As noted in Section III.B. above, we have updated our inventory model since the air quality modeling inventories were calculated. In Chapter III of our RIA, Table III.A.–3 compares the updated Tier 2 model with the air quality analysis modeling and shows that the emission reductions expected from Tier 2/gasoline sulfur will be substantially greater than the amounts originally calculated. If the

[99] For a sensitivity analysis of our cost estimates using alternative assumptions, please see Chapter V of the RIA.

[100] Figure IV.D.–1 is based on the amortized costs from Tables IV.D.–1 and IV.D.–2. Actual capital investments, particularly important for fuels, would occur prior to and during the initial years of the program, as described above in section IV.D.2.

updated numbers were incorporated into our cost-effectiveness we would expect the results to be improved over those shown in this section.

We received a number of comments on our cost-effectiveness analysis in response to our NPRM. Our responses to these comments can be found in the Response To Comments document.

a. Cost-Effectiveness of This Program

We have calculated the cost-effectiveness of the exhaust emission/gasoline sulfur standards and the evaporative emission standards, based on two different approaches. The first considers the net present value of all costs incurred and emission reductions generated over the life of an average Tier 2 vehicle. This per-vehicle approach focuses on the cost-effectiveness of the program from the point of view of the Tier 2 vehicles which will be used to meet the new requirements, and is the method used in our proposal. However, the per-vehicle approach does not capture all of the costs or emission reductions from the Tier 2/gasoline sulfur program since it does not account for the use of low sulfur gasoline in pre-Tier 2 vehicles. Therefore, we have also calculated an aggregate cost-effectiveness using the net present value of costs and emission reductions for all in-use vehicles over a 30-year time frame.

As described earlier in the discussion of the cost of this program, the cost of complying with the new standards will decline over time as manufacturing costs are reduced and amortized capital investments are recovered. To show the effect of declining cost in the per-vehicle cost-effectiveness analysis, we have developed both near term and long term cost-effectiveness values. More specifically, these correspond to vehicles sold in years one and six of the vehicle and fuel programs. Vehicle cost is constant from year six onward. Fuel costs per gallon continue to decline slowly in the years past year six; however, the overall impact of this decline is small and we have decided to use year six results for our long term cost-effectiveness. Chapter VI of the RIA contains a full description of this analysis, and you should look in that document for more details of the results summarized here.

The aggregate approach to calculating the cost-effectiveness of our program involves the net present value of all nationwide emission reductions and costs for a 30-year period beginning with the start of the program in 2004. This timeframe captures both the early period of the program when very few Tier 2 vehicles will be in the fleet, and the later period when essentially all vehicles in the fleet will meet Tier 2 standards. We have calculated the aggregate cost-effectiveness using the net present value of the nationwide emission reductions and costs for each calendar year. These emission reductions and costs are summarized in Sections III.B, III.C, and IV.D.3, and are given for every calendar year in the RIA. For more information on how the aggregate cost-effectiveness was calculated please refer to the RIA.

Our per-vehicle and aggregate cost-effectiveness values are given in Tables IV.D.–3 and IV.D.–4. Table IV.D.–3 summarizes the per-vehicle, net present value lifetime costs, $NMHC+NO_X$ emission reductions, and resulting cost-effectiveness results for our Tier 2/gasoline sulfur program using sales weighted averages of the costs (both near term and long term) and emission reductions of the various vehicle classes affected. Table IV.D.–4 provides the same information from the program aggregate perspective. It includes the net present value of the 30-year stream of vehicle and fuel costs, $NMHC+NO_X$ emission reductions, and the resulting aggregate cost-effectiveness. For simplicity, we have used the midpoint of our estimated range of 20 to 65 percent for the irreversibility effect. The full range of irreversibility would only cause the cost-effectiveness values to differ from those in Table IV.D–3, for example, by $60/ton to $100/ton. Note that, even though we are setting new standards for PM, those standards are already being met, so there is no cost associated with the new PM standard and therefore no separate cost-effectiveness analysis for PM.

Tables IV.D.–3 and IV.D.–4 also display cost-effectiveness values based on two approaches to account for the reductions in SO_2 and tailpipe emitted sulfate particulate matter (PM) associated with the reduction in gasoline sulfur. While these reductions are not central to the program and are therefore not displayed with their own cost-effectiveness, they do represent real emission reductions due to our program. The first set of cost-effectiveness numbers in the tables simply ignores these reductions and bases the cost-effectiveness on only the $NMHC+NO_X$ reductions from Tier 2/gasoline sulfur. The second set accounts for these ancillary reductions by crediting some of the cost of the program to SO_2 and PM reduction. The amount of cost allocated to SO_2 and PM is based on the cost-effectiveness of SO_2 and PM emission reductions that could be obtained from alternative, potential future EPA programs.

TABLE IV.D–3.—PER-VEHICLE COST-EFFECTIVENESS OF THE STANDARDS

Cost basis	Discounted lifetime vehicle & fuel costs	Discounted lifetime NMHC + NO_X reduction (tons)	Discounted lifetime cost-effectiveness per ton	Discounted lifetime cost-effectiveness per ton with SO_2 and direct PM credit [a]
Near term cost (production year 1)	$243	0.110	$2,211	$1,717
Long term cost (production year 6)	205	0.110	1,863	1,368

Notes:
[a] $51 credited to SO_2 ($4,800/ton), $4 to direct PM ($10,000/ton).

TABLE IV.D–4.—AGGREGATE COST-EFFECTIVENESS OF THE STANDARDS

Discounted aggregate vehicle & fuel costs	Discounted aggregate NMHC + NO_X reduction (tons) (millions)	Discounted aggregate cost-effectiveness per ton	Discounted aggregate cost-effectiveness per ton with SO_2 and direct PM credit [a]
$48.1 billion	23.5	$2,047	$1,311

Notes:
[a] $13.8 billion credited to SO_2 ($4,800/ton), $3.5 billion to direct PM ($10,000/ton).

b. How Does the Cost-Effectiveness of This Program Compare With Other Means of Obtaining Mobile Source NO_X + NMHC Reductions?

In comparison with other mobile source control programs, we believe that our program represents the most cost-effective new mobile source control strategy currently available that is capable of generating substantial NO_X + NMHC reductions. This can be seen by comparing the cost-effectiveness of today's program with a number of mobile source standards that EPA has adopted in recent years. Table IV.D.–5 summarizes the cost-effectiveness of several recent EPA actions.

TABLE IV.D.–5.—COST-EFFECTIVENESS OF PREVIOUSLY IMPLEMENTED MOBILE SOURCE PROGRAMS

Program	$/ton [a] NO_X+NMHC
2004 Highway HD Diesel stds	204–399
Nonroad Diesel engine stds	410–650
Tier 1 vehicle controls	1,980–2,690
NLEV	1,859
Marine SI engines	1,128–1,778
On-board diagnostics	2,228

Notes: [a] Costs adjusted to 1997 dollars.

We can see from the table that the cost-effectiveness of the Tier 2/gasoline sulfur standards falls within the range of these other programs. Engine-based standards (the 2004 highway heavy-duty diesel standards, the nonroad diesel engine standards and the marine spark-ignited engine standards) have generally been less costly than Tier 2/gasoline sulfur. Vehicle standards, most similar to today's program, have values comparable to or higher than Tier 2/gasoline sulfur.

The values in Table IV.D.–5 might imply that further reductions in NO_X and VOC from heavy-duty engines could be more cost-effective than the reductions that will be produced from our Tier 2/gasoline sulfur program. However, we do not believe that to be the case. While we are indeed developing a proposal for further control from heavy-duty engines, we expect that substantial further emission reductions will require advanced after-treatment devices. These devices will be more costly than methods used to meet our past standards, and will have difficulty functioning properly without changes to diesel fuel. We therefore expect that the cost effectiveness of future heavy-duty standards is not likely to be significantly less than the cost effectiveness of today's rule.

On the light-duty vehicle side, the last two sets of standards were Tier 1 and NLEV, which had cost-effectiveness comparable to or higher than Tier 2/gasoline sulfur. Compared to engines, these levels reflect the advanced (and more expensive) state of vehicle control technology, where standards have been in effect for a much longer period than for engines. Considering the increased stringency of the Tier 2 standards, it is noteworthy that the cost-effectiveness of Tier 2/gasoline sulfur is in the same range as these actions. Based on these results, Tier 2/gasoline sulfur is a logical and consistent next step in vehicle control.

In conclusion, we believe that the Tier 2/Gasoline Sulfur program is a cost-effective program for mobile source NO_X + NMHC control. We are unable to identify another mobile source control program that would be more cost-effective than Tier 2/gasoline sulfur while also producing equivalent reductions in NO_X and NMHC emissions in the same timeframe as our program.

c. How Does the Cost-Effectiveness of This Program Compare With Other Known Non-Mobile Source Technologies for Reducing NO_X + NMHC?

In evaluating the cost-effectiveness of the Tier 2/Gasoline Sulfur program, we also considered whether our program is cost-effective in comparison with alternative means of attaining or maintaining the NAAQS other than mobile source programs. As described below, we have concluded that Tier 2/Gasoline Sulfur is cost-effective considering the anticipated cost of other technologies that will be needed to help attain and maintain the NAAQS.

In the context of the Agency's rulemaking to revise the ozone and PM NAAQS, [101] the Agency compiled a list of additional known technologies that could be considered in devising new emission reductions strategies.[102] Through this broad review, over 50 technologies were identified that could reduce NO_X or VOC. The cost-effectiveness of these technologies averaged approximately $5,000/ton for VOC and $13,000/ton for NO_X. These values clearly indicate that not only are future emission control strategies likely to be more expensive (less cost-effective) than past strategies, but the cost-effectiveness of our Tier 2/Gasoline Sulfur program falls at the lower end of the range for potential future strategies.

In addition, our Tier 2/Gasoline Sulfur program will deliver critical further reductions that are not readily obtainable by any other means known to the Agency. If all of the technologies modeled in the NAAQS analysis costing less than $10,000/ton were implemented nationwide, they would produce NO_X emission reductions of about 2.9 million tons per year. The Tier 2/Gasoline Sulfur program by itself will generate about 2.8 million tons per year once fully implemented. Given the continuing need for further emission reductions, we believe that Tier 2/Gasoline Sulfur control is clearly a cost-effective approach for attaining and maintaining the NAAQS.

We recognize that the cost-effectiveness calculated for Tier 2/Gasoline Sulfur is not strictly comparable to a figure for measures targeted at nonattainment areas, since Tier 2/Gasoline Sulfur is a nationwide program. However, there are several additional considerations that have led us to conclude that Tier 2/Gasoline Sulfur is cost-effective considering

[101] This rulemaking was remanded by the D.C. Circuit Court on May 14, 1999. However, the analyses completed in support of that rulemaking are still relevant, since they were designed to investigate the cost-effectiveness of a wide variety of potential future emission control strategies.

[102] "Regulatory Impact Analyses for the Particulate Matter and Ozone National Ambient Air Quality Standards and Proposed Regional Haze Rule," Appendix B, "Summary of control measures in the PM, regional haze, and ozone partial attainment analyses," Innovative Strategies and Economics Group, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC, July 17, 1997.

alternative means of attaining and maintaining the NAAQS.

First of all is the fact that the cost effectiveness of Tier 2/Gasoline Sulfur is so much better than the numbers developed for the NAAQS analysis. It is only 20 percent as costly per ton as the $10,000 per ton upper limit employed in that analysis for selecting suitable strategies even though, as noted above, Tier 2/Gasoline Sulfur will produce almost the same level of emission reduction. Furthermore, as a national program, Tier 2/Gasoline Sulfur can be implemented as a single unified rule without the need for individual action by each of the states.

In dealing with the question of comparing local and national programs, it is also relevant to point out that, because of air transport, the need for NO_X control is a broad regional issue not confined to non-attainment areas only. To reach attainment, future controls will need to be applied over widespread areas of the country. In the analyses supporting the recent NO_X standards for highway diesel engines,[103] we looked at this question in some detail and concluded that the regions expected to impact ozone levels in ozone nonattainment areas accounted for over 85% of total NO_X emissions from a national heavy-duty engine control program. Similarly, NO_X emissions in attainment areas also contribute to particulate matter nonattainment problems in downwind areas. Thus, the distinction between local and national control programs for NO_X is less important than it might appear.

Finally, the statute indicates that in considering the cost-effectiveness of Tier 2/Gasoline Sulfur EPA should consider not only attainment, but also maintenance of the standards. Tier 2/Gasoline Sulfur—unlike nonattainment area measures—will achieve attainment area reductions that, among other effects, will help to maintain air quality that meets the NAAQS. These reductions relate not only to the ozone and PM NAAQS, but also to SO_2 and NO_2, and to CO.

In summary, given the array of controls that will have to be implemented to make progress toward attaining and maintaining the NAAQS, we believe that the weight of the evidence from alternative means of providing substantial NO_X + NMHC emission reductions indicates that the Tier 2/Gasoline Sulfur program is cost-effective. This is true from the perspective of other mobile source control programs or from the perspective of other stationary source technologies that might be considered.

5. Does the Value of the Benefits Outweigh the Cost of the Standards?

While relative cost-effectiveness is the principal economic policy criterion established for these standards in the Clean Air Act (see CAA § 202(i)), further insight regarding the merits of the standards can be provided by benefit-cost analysis. The purpose of this section is to summarize the methods we used and results we obtained in conducting an analysis of the economic benefits of the Tier 2 program, and to compare these economic benefits with the estimated costs of the rule. In summary, the results of our analysis using the EPAs preferred approach to valuing premature mortality indicate that the economic benefits of the Tier 2/gasoline sulfur standards will likely exceed the costs of meeting the standards by about $20 billion (1997$).

a. What Is the Purpose of This Benefit-Cost Comparison?

Benefit-cost analysis (BCA) is a useful tool for evaluating the economic merits of proposed changes in environmental programs and policies. In its traditional application, BCA estimates the economic ‘‘efficiency’’ of proposed changes in public policy by organizing the various expected consequences and representing those changes in terms of dollars. Expressing the effects of these policy changes in dollar terms provides a common basis for measuring and comparing these various effects. Because improvement in economic efficiency is typically defined to mean maximization of total wealth spread among all members of society, traditional BCA must be supplemented with other analyses in order to gain a full appreciation of the potential merits of new policies and programs. These other analyses may include such things as examinations of legal and institutional constraints and effects; engineering analyses of technology feasibility, performance and cost; or assessment of the air quality need.

In addition to the narrow, economic efficiency focus of most BCAs, the technique is also limited in its ability to project future economic consequences of alternative policies in a definitive way. Critical limitations on the availability, validity, or reliability of data; limitations in the scope and capabilities of environmental and economic effect models; and controversies and uncertainties surrounding key underlying scientific and economic literature all contribute to an inability to estimate the economic effects of environmental policy changes in exact and unambiguous terms. Under these circumstances, we consider it most appropriate to view BCA as a tool to inform, but not dictate, regulatory decisions such as the ones reflected in today's rule.

Despite the limitations inherent in BCA of environmental programs, we consider it useful to estimate the potential benefits of today's action both in terms of physical changes in human health and welfare and environmental change, and in terms of the estimated economic value of those physical changes.

b. What Was Our Overall Approach to the Benefit-Cost Analysis?

The basic question we sought to answer in the BCA was: ‘‘What are the net yearly economic benefits to society of the reduction in mobile source emissions likely to be achieved by the final Tier 2 program?’’ In designing an analysis to answer this question, we selected a future year for analysis (2030) that is representative of full-implementation of the program (*i.e.,* when the U.S. car and light truck population is virtually only Tier 2 vehicles). We also adopted an analytical structure and sequence similar to that used in the ‘‘section 812 studies’’ [104] to estimate the total benefits and costs of the entire Clean Air Act. Moreover, we used many of the same models, and assumptions actually used in the section 812 studies, and other Regulatory Impact Analyses (RIA's) prepared by the Office of Air and Radiation. By adopting the major design elements, models, and assumptions developed for the section 812 studies and other RIA's, we have largely relied on methods which have already received extensive review by the independent Science Advisory Board, by the public, and by other federal agencies.

c. What Are the Significant Limitations of the Benefit-Cost Analysis?

Every BCA examining the potential effects of a change in environmental protection requirements is limited to some extent by data gaps, limitations in model capabilities (such as geographic coverage), and uncertainties in the underlying scientific and economic

[103] Final Regulatory Impact Analysis: Control of Emissions of Air Pollution from Highway Heavy-Duty Engines, September 16, 1997.

[104] The ‘‘section 812 studies'' refers to (1) US EPA, Report to Congress: The Benefits and Costs of the Clean Air Act, 1970 to 1990, October 1997 (also known as the ‘‘section 812 Retrospective); and (2) the first in the ongoing series of prospective studies estimating the total costs and benefits of the Clean Air Act (see EPA report number: EPA–410–R–99–001, November 1999).

studies used to configure the benefit and cost models. Deficiencies in the scientific literature often result in the inability to estimate changes in health and environmental effects, such as potential increases in premature mortality associated with increased exposure to carbon monoxide. Deficiencies in the economics literature often result in the inability to assign economic values even to those health and environmental outcomes which can be quantified, such as changes in visibility in residential areas. While these general uncertainties in the underlying scientific and economics literatures are discussed in detail in the RIA and its supporting documents and references, the key uncertainties which have a bearing on the results of the BCA of today's action are:

- The exclusion of potentially significant benefit categories (*e.g.,* health and ecological benefits of incidentally controlled hazardous air pollutants),
- Errors in measurement and projection for variables such as population growth,
- Variability in the estimated relationships of health and welfare effects to changes in pollutant concentrations.

In addition to these uncertainties and shortcomings which pervade all analyses of criteria air pollutant control programs, a number of limitations apply specifically to the BCA of today's action. Though we used the best data and models currently available, we were required to adopt a number of simplifying assumptions and to use data sets which, while reasonably close, did not match precisely the conditions and effects expected to result from implementation of the standards. For example, to estimate the effects of the program at full implementation we projected vehicle miles traveled and populations in the year 2030. These assumptions may play a significant role in determining the magnitude of the benefits estimate. In addition, although the emissions data sets used for this analysis have been updated from those used in the proposal, they may not anticipate the emissions reductions realized by other future actions and by expected near-future control programs. For example, it is possible that the Tier 2/gasoline sulfur standards will not be the governing vehicle emissions standards in 2030. In the years before 2030, the benefits from the Tier 2 program will be less than those estimated here (significantly less in the early years), because the Tier 2 fleet will not be fully phased in.

Finally, the implementation period for phasing-in the rule requirements is a critical period that deserves careful evaluation. The benefit-cost analysis for 2030 is not significantly affected by alternative phase-in decisions, the primary impact of which will occur in the 2005–2015 time frame. As a result, the analysis of phase-in alternatives must rely on other types of analysis (*e.g.,* cost-effectiveness analysis).

The key limitations and uncertainties unique to the BCA of the final rule, therefore, include:

- Uncertainties in the estimation of future year emissions inventories and air quality,
- Uncertainties associated with the extrapolation of air quality monitoring data to some unmonitored areas required to better capture the effects of the standards on affected populations, and
- Uncertainties associated with the effect of potential future actions to limit emissions.

Despite these uncertainties, which are discussed in more detail or referenced in the RIA, we believe the BCA provide a reasonable indication of the expected economic benefits of the Tier 2 program in 2030 under one set of assumptions. This is because the analysis focuses on estimating the economic effects of the *changes* in air quality conditions expected to result from today's action, rather than focusing on developing a precise prediction of the *absolute* levels of air quality likely to prevail in 2030. An analysis focusing on the changes in air quality can give useful insights into the likely economic effects of emission reductions of the magnitude expected to result from today's rule.

d. How Has the Benefit-Cost Analysis Changed From Proposal?

We significantly improved the analysis that was presented at proposal. For the final rule, EPA updated the emissions inventory from 1990 to 1996 using updated models, refined the projections of the effects of the rule when it is fully implemented, and updated our air quality modeling to reflect new programs issued since 1990. In addition, we also updated our assumptions for estimating physical effects and monetary benefits based on recommendations from the EPA's Science Advisory Board (SAB) during the summer of 1999. Details on these recommendations can be found in the advisory statements published by the SAB.[105] All of the changes made since the analysis at proposal serve to update and improve the analysis.

e. How Did We Perform the Benefit-Cost Analysis?

The analytical sequence begins with a projection of the mix of technologies likely to be deployed to comply with the new standards, and the costs incurred and emissions reductions achieved by these changes in technology. The Tier 2 program has various cost and emission related components, as described earlier in this section. These components would begin at various times and in some cases would phase in over time. This means that during the early years of the program there would not be a consistent match between cost and benefits. This is especially true for the vehicle control portions of the program, where the full vehicle cost would be incurred at the time of vehicle purchase, while the fuel cost along with the emission reductions and benefits would occur throughout the lifetime of the vehicle.

To develop a benefit-cost number that is representative of a fleet of Tier 2 vehicles, we need to have a stable set of cost and emission reductions to use. This means using a future year where the fleet is fully turned over and there is a consistent annual cost and annual emission reduction. For the Tier 2 program, this stability would not occur until well into the future. For this analysis, we selected the year 2030. The resulting analysis represents a snapshot of benefits and costs in a future year in which the light-duty fleet consists almost entirely of Tier 2 vehicles. As such, it depicts the maximum emission reductions (and resultant benefits) and among the lowest costs that would be achieved in any one year by the program on a ''per mile'' basis. (Note, however, that net benefits would continue to grow over time beyond those resulting from this analysis, because of growth in population and vehicle miles traveled.) Thus, based on the long-term costs for a fully turned over fleet, the resulting benefit-cost ratio will be close to its maximum point (for those benefits which we have been able to value).

To present a BCA, we designed the cost estimate to reflect conditions in the same year as the benefit valuation. Costs are, therefore, developed for the year 2030 fleet. For this purpose we used the long term cost once the capital costs have been recovered and the manufacturing learning curve

[105] Full documentation of the SAB recommendations can be found at their website (*www.epa.gov/sab*) under the following references: EPA–SAB–COUNCIL–ADV–98–003, 1998; EPA–SAB–COUNCIL–ADV–99–05, 1999; EPA–SAB–COUNCIL–ADV–99–012, 1999; EPA–SAB–COUNCIL–ADV–00–001, 1999; and EPA–SAB–COUNCIL–ADV–00–002, 1999.

reductions have been realized, since this will be the case in 2030.

We also made adjustments in the costs to account for the fact that there is a time difference between when some of the costs are expended and when the benefits are realized. The vehicle costs are expended when the vehicle is sold, while the fuel related costs and the benefits are distributed over the life of the vehicle. We resolved this difference by using costs distributed over time such that there is a constant cost per ton of emissions reduction and such that the net present value of these distributed costs corresponds to the net present value of the actual costs.

The resulting adjusted costs are somewhat greater than the expected actual annual cost of the program, reflecting the time value adjustment. Thus, the costs presented in this section do not represent expected actual annual costs for 2030. Rather, they represent an approximation of the steady-state cost per ton that would likely prevail in that time period. The benefit cost ratio for the earlier years of the program would be expected to be lower than that based on these costs, since the per-vehicle costs are larger in the early years of the program while the benefits are smaller.

In order to estimate the changes in air quality conditions which would result from these emissions reductions, we developed two separate, year 2030 emissions inventories to be used as inputs to the air quality models. The first, baseline inventory, reflects the best available approximation of the county-by-county emissions for NO_X, VOC, and SO_2 expected to prevail in the year 2030 in the absence of the standards. To generate the second, control case inventory, we first estimated the change in vehicle emissions, by pollutant and by county, expected to be achieved by the 2030 control scenario described above. We then took the baseline emissions inventory and subtracted the estimated reduction for each county-pollutant combination to generate the second, control case emissions inventory. Taken together, the two resulting emissions inventories reflect two alternative states of the world and the differences between them represent our best estimate of the reductions in emissions which would result from our control scenario.

With these two emissions inventories in hand, the next step was to ''map'' the county-by-county and pollutant-by-pollutant emission estimates to the input grid cells of two air quality models and one deposition model. The first model, called the Urban Airshed Model (UAM), is designed to estimate the tropospheric ozone concentrations resulting from a specific inventory of emissions of ozone precursor pollutants, particularly NO_X and NMHC. The second model, called the Climatological Regional Dispersion Model Source-Receptor Matrix model (S–R Matrix), is designed to estimate the changes in ambient particulate matter and visibility which would result from a specific set of changes in emissions of primary particulate matter and secondary particulate matter precursors, such as SO_2, NO_X, and NMHC. Also, nitrogen loadings to watersheds were estimated using factors derived from previous modeling from the Regional Acid Deposition Model (RADM). By running both the baseline and control case emissions inventories through these models, we were able to estimate the expected 2030 air quality conditions and the changes in air quality conditions which would result from the emissions reductions expected to be achieved by the Tier 2 program.

After developing these two sets of year 2030 air quality profiles, we used the same health and environmental effect models used in the section 812 studies to calculate the differences in human health and environmental outcomes projected to occur with and without the proposed standards. Specifically, we used the Criteria Air Pollutant Modeling System (CAPMS) to estimate changes in human health outcomes, and the Agricultural Simulation Model (AGSIM) to estimate changes in yields of a selected few agricultural crops. In addition, the impacts of reduced visibility impairment and estimates of the effect of changes in nitrogen deposition to a selection of sensitive estuaries were estimated using slightly modified versions of the methods used in the section 812 studies. Several air quality-related health and environmental benefits, however, could not be calculated for the BCA of today's proposed standards. Changes in human health and environmental effects due to changes in ambient concentrations of carbon monoxide (CO), gaseous sulfur dioxide (SO_2), gaseous nitrogen dioxide (NO_2), and hazardous air pollutants could not be included. In addition, some health and environmental benefits from changes in ozone and PM could not be included in our analysis (*i.e.,* commercial forestry benefits).

To characterize the total economic value of the reductions in adverse effects achieved across the lower 48 states,[106] we used the same set of economic valuation coefficients and models used in the section 812 studies, as approved by the SAB. The net monetary benefits of the Tier 2 program were then calculated by subtracting the estimated costs of compliance from the estimated monetary benefits of the reductions in adverse health and environmental effects.

The last step of the analysis is to characterize the uncertainty surrounding our estimate of benefits. Again, we follow the recommendations of the SAB for the presentation of uncertainty. They recommend that a primary estimate should be presented along with a description of the uncertainty associated with each endpoint. At proposal, our characterization of uncertainty was based on an estimated range of benefits which might occur if important but uncertain underlying factors were allowed to vary. This approach, however, is criticized by the SAB because while the low- or high-end estimates provided for individual endpoints was ''plausible,'' the probability of all of the assumptions in these estimates occurring simultaneously was likely to be small.

Therefore, for the final Tier 2/gasoline sulfur rule, the benefit analysis adopts an approach similar to the section 812 study. Our analysis first presents our estimate for a primary set of benefit endpoints followed by a presentation of ''alternative calculations'' of key health and welfare endpoints to characterize the uncertainty in this primary set. However, the adoption of a value for the projected reduction in the risk of premature mortality is the subject of continuing discussion within the economic and public policy analysis community within and outside the Administration. In response to the sensitivity on this issue, we provide estimates reflecting two alternative approaches for mortality benefits: the EPAs preferred approach using the value of a statistical life, and an alternative approach using the value of a statistical life years. These are discussed further in section f. of this presentation. The presentation of the alternative calculations for certain endpoints seeks to demonstrate how much the overall benefit estimate might vary based on the value EPA has given to a parameter (which has some uncertainty associated with it) underlying the estimates for human health and environmental effect incidence and the economic valuation

[106] Though California is included based on the expectation that reductions in surrounding states will achieve some benefits in California, this analysis does not assume additional reductions in California emissions beyond those already achieved by prevailing standards.

of those effects. These alternative calculations represent conditions that are possible to occur, however, EPA has selected the best supported values based on current scientific literature for use in the primary estimate. The alternate calculations include:

- Presentation of an estimated confidence interval around the Primary estimate of benefits to characterize The standard error in the C-R and valuation studies used in developing benefit estimates for each endpoint;
- Valuing PM-related premature mortality based on a different C-R study;
- Value of avoided premature mortality incidences based on statistical life years;
- Consideration of reversals in chronic bronchitis treated as lowest severity cases;
- Value of visibility changes in all Class I areas;
- Value of visibility changes in Eastern U.S. residential areas;
- Value of visibility changes in Western U.S. residential areas;
- Value of reduced household soiling damage; and
- Avoided costs of reducing nitrogen loadings in east coast estuaries.

For instance, the study by Dockery, et al. estimates of the relationship between PM exposure and premature mortality is a plausible alternative to the Pope, et al. study used for the Primary estimate of benefits. The SAB has noted that ''the study had better monitoring with less measurement error than did most other studies'' (EPA–SAB–COUNCIL–ADV–99–012, 1999). The Dockery study had a more limited geographic scope (and a smaller study population) than the Pope, et al. study and the Pope study appears more likely to mitigate a key source of potential confounding. The Dockery study also covered a broader age category (25 and older compared to 30 and older in the Pope study) and followed the cohort for a longer period (15 years compared to 8 years in the Pope study). For these reasons, the Dockery study is considered to be a plausible alternative estimate of the avoided premature mortality incidences associated with the final Tier 2/gasoline sulfur rule. The alternative estimate for mortality can be substituted for the valuation component in our primary estimate of mortality benefits to observe how the net benefits of the program may be influenced by this assumption. Unfortunately, it is not possible to combine all of the assumptions used in the alternate calculations to arrive at different total benefit estimates because, it is highly unlikely that the selected combination of alternative values would all occur simultaneously. Therefore, it is better to consider each alternative calculation individually to assess the uncertainty in the estimate.

In addition to the estimate for the primary set of endpoints and alternative calculations of benefits, our RIA also presents an appendix with supplemental benefit estimates and sensitivity analyses of other key parameters in the benefit analysis that have greater uncertainty surrounding them due to limitations in the scientific literature. Supplemental estimates are presented for premature mortality associated with short-term exposures to PM and ozone, asthma attacks, occurrences of moderate or worse asthma symptoms, and an estimate of the avoided incidences of premature mortality in infants.

Even with our efforts to fully disclose the uncertainty in our estimate, this uncertainty presentation method does not provide a definitive or complete picture of the true range of monetized benefits estimates. This approach, as implemented in this BCA, does not reflect important uncertainties in earlier steps of the analysis, including estimation of compliance technologies and strategies, emissions reductions and costs associated with those technologies and strategies, and air quality and deposition changes achieved by those emissions reductions. Nor does this approach provide a full accounting of all potential benefits associated with the Tier 2/gasoline sulfur standards, due to data or methodological limitations. Therefore, the uncertainty range is only representative of those benefits that we were able to quantify and monetize.

f. What Were the Results of the Benefit-Cost Analysis?

The BCA for the Tier 2 program reflects a single year ''snapshot'' of the yearly benefits and costs expected to be realized once the standards have been fully implemented and non-compliant vehicles have all been retired. Near-term costs will be higher than long-run costs as vehicle manufacturers and oil companies invest in new capital equipment and develop and implement new technologies. In addition, near-term benefits will be lower than long-run benefits because it will take a number of years for Tier 2-compliant vehicles to fully displace older, more polluting vehicles. However, as described earlier, we have adjusted the cost estimates upward to compensate for some of this discrepancy in the timing of benefits and costs and to ensure that the long-term benefits and costs are calculated on a consistent basis. The resulting adjusted long-term cost value is given in Table IV.D.–5a. Because of the adjustment process, the cost estimates should not be interpreted as reflecting the actual costs expected to be incurred in the year 2030. Actual program costs can be found in Section IV.D.3.

TABLE IV.D.–5A.—ADJUSTED COST OF THE TIER 2/GASOLINE SULFUR RULE FOR COMPARISON TO BENEFITS

Cost basis	Adjusted cost (billions of dollars)
Long term [a]	5.3

Notes:
[a] Note that this estimate of cost is only for purposes of comparing with our 2030 benefits estimate. See Figure IV.D.–1 for our portrayal of total annualized cost of the rule.

With respect to the benefits, several different measures of benefits can be useful to compare and contrast to the estimated compliance costs. These benefit measures include (a) the tons of emissions reductions achieved, (b) the reductions in incidences of adverse health and environmental effects, and (c) the estimated economic value of those reduced adverse effects. Calculating the cost per ton of pollutant reduced is particularly useful for comparing the cost-effectiveness of the new standards or programs against existing programs or alternative new programs achieving reductions in the same pollutant or combination of pollutants. The cost-effectiveness analysis presented earlier in this preamble provides such calculations on a per-vehicle basis. Considering the absolute numbers of avoided adverse health and environmental effects can also provide valuable insights into the nature of the health and environmental problem being addressed by the rule as well as the magnitude of the total public health and environmental gains potentially achieved by the rule. Finally, when considered along with other important economic dimensions —including environmental justice, small business financial effects, and other outcomes related to the distribution of benefits and costs among particular groups— the direct comparison of quantified economic benefits and economic costs can provide useful insights into the potential magnitude of the estimated net economic effect of the rule, keeping in mind the limited set of effects we are able to monetize.

Table IV.D.–6 presents the EPAs preferred approach to estimate the benefits of both the estimated reductions in adverse effect incidences and the estimated economic value of those incidence reductions. Specifically, the table lists the avoided incidences of individual health and environmental effects, the pollutant associated with each of these endpoints, and the estimated economic value of those avoided incidences. For several effects, particularly environmental effects, direct calculation of economic value in response to air quality conditions is performed, eliminating the intermediate step of calculating incidences. As the table indicates, we estimate that the Tier 2 program will produce 2300 fewer cases of chronic bronchitis, and we also see significant improvements in minor restricted activity days (with an estimated 6,255,500 fewer cases). Our estimate also incorporates significant reductions in impacts on children's health, showing reductions of 7,900 cases of acute bronchitis, 87,200 fewer cases of lower respiratory symptoms, and 86,600 fewer cases of upper respiratory symptoms in asthmatic children.

Total monetized benefits, however, are driven primarily by the estimated 4300 fewer premature fatalities. The adoption of a value for the projected reduction in the risk of premature mortality is the subject of continuing discussion within the economic and public policy analysis community within and outside the Administration. In response to the sensitivity on this issue, we provide estimates reflecting two alternative approaches. The first approach—supported by some in the above community and preferred by EPA—uses a Value of a Statistical Life (VSL) approach developed for the Clean Air Act Section 812 benefit-cost studies. This VSL estimate of $5.9 million (1997$) was derived from a set of 26 studies identified by EPA using criteria established in Viscusi (1992), as those most appropriate for environmental policy analysis applications.

An alternative, age-adjusted approach is preferred by some others in the above community both within and outside the Administration. This approach was also developed for the Section 812 studies and addresses concerns with applying the VSL estimate—reflecting a valuation derived mostly from labor market studies involving healthy working-age manual laborers—to PM-related mortality risks that are primarily associated with older populations and those with impaired health status. This alternative approach leads to an estimate of the value of a statistical life year (VSLY), which is derived directly from the VSL estimate. It differs only in incorporating an explicit assumption about the number of life years saved and an implicit assumption that the valuation of each life year is not affected by age.[107] The mean VSLY is $360,000 (1997$); combining this number with a mean life expectancy of 14 years yields an age-adjusted VSL of $3.6 million (1997$).

Both approaches are imperfect, and raise difficult methodological issues which are discussed in depth in the recently published Section 812 Prospective Study, the draft EPA Economic Guidelines, and the peer-review commentaries prepared in support of each of these documents. For example, both methodologies embed assumptions (explicit or implicit) about which there is little or no definitive scientific guidance. In particular, both methods adopt the assumption that the risk versus dollars trade-offs revealed by available labor market studies are applicable to the risk versus dollar trade-offs in an air pollution context.

EPA currently prefers the VSL approach because, essentially, the method reflects the direct, application of what EPA considers to be the most reliable estimates for valuation of premature mortality available in the current economic literature. While there are several differences between the labor market studies EPA uses to derive a VSL estimate and the particulate matter air pollution context addressed here, those differences in the affected populations and the nature of the risks imply both upward and downward adjustments. For example, adjusting for age differences may imply the need to adjust the $5.9 million VSL downward as would adjusting for health differences, but the involuntary nature of air pollution-related risks and the lower level of risk-aversion of the manual laborers in the labor market studies may imply the need for upward adjustments. In the absence of a comprehensive and balanced set of adjustment factors, EPA believes it is reasonable to continue to use the $5.9 million value while acknowledging the significant limitations and uncertainties in the available literature. Furthermore, EPA prefers not to draw distinctions in the monetary value assigned to the lives saved even if they differ in age, health status, socioeconomic status, gender or other characteristic of the adult population.

Those who favor the alternative, age-adjusted approach (i.e. the VSLY approach) emphasize that the value of a statistical life is not a single number relevant for all situations. Indeed, the VSL estimate of $5.9 million (1997 dollars) is itself the central tendency of a number of estimates of the VSL for some rather narrowly defined populations. When there are significant differences between the population affected by a particular health risk and the populations used in the labor market studies—as is the case here—they prefer to adjust the VSL estimate to reflect those differences. While acknowledging that the VSLY approach provides an admittedly crude adjustment (for age though not for other possible differences between the populations), they point out that it has the advantage of yielding an estimate that is not presumptively biased. Proponents of adjusting for age differences using the VSLY approach fully concur that enormous uncertainty remains on both sides of this estimate—upwards as well as downwards—and that the populations differ in ways other than age (and therefore life expectancy). But rather than waiting for all relevant questions to be answered, they prefer a process of refining estimates by incorporating new information and evidence as it becomes available.

In addition to the presentation of mortality valuation, this table also indicates with a ''B'' those additional health and environmental benefits which could not be expressed in quantitative incidence and/or economic value terms. A full listing of the benefit categories that could not be quantified or monetized in our estimate are provided in Table IV.D.–8. For instance, visibility is expected to improve in all areas of the country, with the largest improvements occurring in heavily populated residential areas (*e.g.,* 21% of the metropolitan areas show an improvement of 0.5 deciviews or more). However, due to limitations on sources to value these effects, we include a ''B'' in the primary estimate table for this category. Likewise, the Tier 2/gasoline sulfur rule will also provide progress for some estuaries to meet their goals for reducing nitrogen deposition (*e.g.,* nitrogen loadings for the Albemarle/ Pamlico Sound are reduced by 27% of their reductions goal), however, this endpoint is also displayed with a ''B'' in the table. A full appreciation of the overall economic consequences of the Tier 2/gasoline sulfur standards requires consideration of all benefits and costs expected to result from the new standards, not just those benefits and

[107] Specifically, the VSLY estimate is calculated by amortizing the $5.9 million mean VSL estimate over the 35 years of life expectancy associated with subjects in the labor market studies. The resulting estimate, using a 5 percent discount rate, is $360,000 per life-year saved in 1997 dollars. This annual average value of a life-year is then multiplied times the number of years of remaining life expectancy for the affected population (in the case of PM-related premature mortality, the average number of $ life-years saved is 14.

costs which could be expressed here in dollar terms.

In summary, the VSL approach—the approach EPA prefers—yields a monetized benefit estimate of $25.2 billion in 2030. The alternative, age-adjusted VSLY approach (presented in Table IV.D.7) yields monetary benefits of approximately $13.8 billion in 2030.

TABLE IV.D.–6.—EPA PREFERRED ESTIMATE OF THE ANNUAL QUANTIFIED AND MONETIZED BENEFITS ASSOCIATED WITH IMPROVED AIR QUALITY RESULTING FROM THE TIER 2/GASOLINE SULFUR RULE IN 2030

Endpoint	Pollutant	Avoided incidence[c] (cases/year)	Monetary benefits[d] (millions 1997$)
Premature mortality[a, b] (adults, 30 and over)	PM[b]	4,300	$23,380
Chronic asthma (adult males, 27 and over)	Ozone	400	10
Chronic bronchitis	PM	2,300	730
Hospital Admissions from Respiratory Causes	Ozone and PM	2,200	20
Hospital Admissions from Cardiovascular Causes	Ozone and PM	800	10
Emergency Room Visits for Asthma	Ozone and PM	1,200	<1
Acute bronchitis (children, 8–12)	PM	7,900	<1
Lower respiratory symptoms (LRS) (children, 7–14)	PM	87,100	<5
Upper respiratory symptoms (URS) (asthmatic children, 9–11)	PM	86,500	<5
Shortness of breath (African American asthmatics, 7–12)	PM	17,400	<1
Work loss days (WLD) (adults, 18–65)	PM	682,900	70
Minor restricted activity days (MRAD)/Acute respiratory symptoms	Ozone and PM	5,855,000	270
Other health effects[c]	Ozone, PM, CO, HAPS	$U_1+U_2+U_3+U_4$	$B_1+B_2+B_3+B_4$
Decreased worker productivity	Ozone		140
Recreational visibility (86 Class I Areas)	PM		370
Residential visibility	PM		B_5
Household soiling damage	PM		B_6
Materials damage	PM		B_7
Nitrogen Deposition to Estuaries	Nitrogen		B_8
Agricultural crop damage (6 crops)	Ozone		220
Commercial forest damage	Ozone		B_9
Other welfare effects[e]	Ozone, PM, CO, HAPS		$B_{10}+B_{11}+B_{12}+B_{13}$
Monetized Total[f, g]			$25,220+B

Notes:

[a] Premature mortality associated with ozone is not separately included in this analysis. It is assumed that the Pope, et al. C–R function for premature mortality captures both PM mortality benefits and any mortality benefits associated with other air pollutants. Also note that the valuation assumes the 5 year distributed lag structure described earlier.

[b] PM reductions are due to reductions in NO_X and SO_2 resulting from the Tier 2/Gasoline Sulfur rule.

[c] Incidences are rounded to the nearest 100.

[d] Dollar values are rounded to the nearest 10 million.

[e] The Ui are the incidences and the Bi are the values for the unquantified category i. A detailed listing of unquantified PM, ozone, CO, and HAPS related health and welfare effects is provided in Table IV.D.–8.

[f] B is equal to the sum of all unmonetized categories, i.e. $B_1+B_2+ * * * +B_{13}$.

[g] These estimates are based on the EPA preferred approach for valuing reductions in premature mortality, the VSL approach. This approach and an alternative, age-adjusted approach—the VSLY approach—are discussed more fully in section f above.

TABLE IV.D.–7.—TIER 2/GASOLINE SULFUR RULE: 2030 MONETIZED BENEFITS ESTIMATES FOR ALTERNATIVE PREMATURE MORTALITY VALUATION APPROACHES

[Millions of 1997 dollars]

Premature mortality valuation approach	PM mortality benefits	Total benefits
Value of statistical life (VSL) ($5.9 million per life saved)[a]	$23,380	$25,220 + B
Value of statistical life-years (VSLY) ($360,000 per life-year saved, which implies $3.6 million per life saved, based on the mean of 14 life years saved)[a,b].	11,900	13,790 + B

Notes:

[a] Premature mortality estimates are determined assuming a 5 year distributed lag, which applies 25 percent of the incidence in year 1 and 2, and then 16.7 percent of the incidence in years 3, 4, and 5.

[b] The VSLY estimate is calculated by amortizing the $5.9 million mean VSL estimate over the 35 years of life expectancy associated with subjects in the labor market studies used to obtain the VSL estimate. The resulting estimate, using a 5 percent discount rate, is $360,000 per life-year saved in 1997 dollars. This approach is discussed more fully in section f above.

TABLE IV.D.–8.—ADDITIONAL, NON-MONETIZED BENEFITS OF THE TIER 2/GASOLINE SULFUR STANDARDS

Pollutant	Unquantified effects
Ozone Health	Premature mortality.[a] Increased airway responsiveness to stimuli. Inflammation in the lung Chronic respiratory damage Premature aging of the lungs Acute inflammation and respiratory cell damage Increased susceptibility to respiratory infection Non-asthma respiratory emergency room visits Reductions in screening of UV–b radiation
Ozone Welfare	Decreased yields for commercial forests Decreased yields for fruits and vegetables Decreased yields for non-commercial crops Damage to urban ornamental plants Impacts on recreational demand from damaged forest aesthetics Damage to ecosystem functions
PM Health	Infant mortality Low birth weight Changes in pulmonary function Chronic respiratory diseases other than chronic bronchitis Morphological changes Altered host defense mechanisms
Nitrogen and Sulfate Deposition Welfare	Impacts of acidic sulfate and nitrate deposition on commercial forests Impacts of acidic deposition to commercial freshwater fishing Impacts of acidic deposition to recreation in terrestrial ecosystems Reduced existence values for currently healthy ecosystems Impacts of nitrogen deposition on commercial fishing, agriculture, and forests Impacts of nitrogen deposition on recreation in estuarine ecosystems
CO Health	Premature mortality [a] Behavioral effects Hospital admissions—respiratory, cardiovascular, and other Other cardiovascular effects Developmental effects Decreased time to onset of angina Non-asthma respiratory ER visits
HAPS Health	Cancer (benzene, 1,3-butadiene, formaldehyde, acetaldehyde) Anemia (benzene) Disruption of production of blood components (benzene) Reduction in the number of blood platelets (benzene) Excessive bone marrow formation (benzene) Depression of lymphocyte counts (benzene) Reproductive and developmental effects (1,3-butadiene) Irritation of eyes and mucus membranes (formaldehyde) Respiratory irritation (formaldehyde) Asthma attacks in asthmatics (formaldehyde) Asthma-like symptoms in non-asthmatics (formaldehyde) Irritation of the eyes, skin, and respiratory tract (acetaldehyde)
HAPS Welfare	Direct toxic effects to animals Bioaccumlation in the food chain

[a] Premature mortality associated with ozone and carbon monoxide is not separately included in this analysis. It is assumed that the Pope, et al. C–R function for premature mortality captures both PM mortality benefits and any mortality benefits associated with other air pollutants.

In addition, in analyzing the present rule, we recognized that the benefits estimates were subject to a number of uncertainties with other parameters. In Table IV D–9, we present alternative calculations representing the effect of different assumptions on individual elements of the benefits analysis and on the total benefits estimate. For example, this table can be used to answer questions like ‘‘What would total benefits be if we were to use the Dockery, et al. C–R function to estimate avoided premature mortality?’’ This table also displays some assumptions that can be made to value some of the categories that are indicated with a ‘‘B’’ in the primary estimate. Overall, this table provides alternative calculations both for valuation issues (e.g., the correct value for a statistical life saved) and for physical effects issues (e.g., how reversals in chronic illnesses are treated). We show how the alternative assumption being valued would change the resulting total primary estimate, and the percentage change from the primary estimate associated with the alternative calculation. This table is not meant to be comprehensive. Rather, it reflects some of the key issues identified by EPA or commenters as likely to have a significant impact on total benefits.

TABLE IV.D.–9.—ALTERNATIVE BENEFITS CALCULATIONS FOR THE TIER 2 GASOLINE SULFUR RULE IN 2030

Alternative calculation	Impact on primary benefit estimate (million 1997$)
5th percentile of ''measurement'' uncertainty distribution	−$20,300 (−81%)
95th percentile of ''measurement'' uncertainty distribution	+33,900 (+134%)
PM-related premature mortality based on Dockery et al.	+30,200 (+120%)
Value of avoided premature mortality incidences based on statistical life years.	−11,500 (−46%)
Reversals in chronic bronchitis treated as lowest severity cases	+280 (+1%)
Value of visibility changes in all class I areas	+180 (+1%)
Value of visibility changes in eastern U.S. residential areas	+420 (+2%)
Value of visibility changes in western U.S. residential areas	+130 (+1%)
Household soiling damage	+110 (+1%)
Avoided costs of reducing nitrogen loadings in east coast estuaries	+160 (+1%)

The estimated adjusted cost of implementing the final Tier 2 program is $5.3 billion (1997$), while the estimate of monetized benefits using EPA's preferred approach for monetizing reductions in PM-related premature mortality—the VSL approach—are $25.2 billion (1997$). Monetized net benefits using EPA's preferred method for valuing avoided incidences of premature mortality are approximately $19.9 billion (1997$). Using the alternative, age-adjusted approach—the VSLY approach—total monetized benefits are projected to be around $13.8 billion (1997$). Monetized net benefits using this approach are approximately $8.5 billion (1997$). Therefore, implementation of the Tier 2 program will provide society with a net gain in social welfare. Tables VI.D.–10a and IV.D.–10b summarize the costs, benefits, and net benefits for the two alternative valuation approaches.

TABLE IV.D.–10A.—2030 ANNUAL MONETIZED COSTS, BENEFITS, AND NET BENEFITS FOR THE FINAL TIER 2/GASOLINE SULFUR RULE: EPA PREFERRED ESTIMATE USING THE VALUE OF STATISTICAL LIVES SAVED APPROACH TO VALUE REDUCTIONS IN PREMATURE MORTALITY [a]

	Billion 1997 (dollars)
Adjusted compliance costs	$5.3
Monetized PM-related benefits [b].	24.7+B_{PM}
Monetized Ozone-related benefits[b].	0.5+B_{Ozone}
Monetized net benefits [c,d]	19.9+B

Notes:

[a] For this section , all costs and benefits are rounded to the nearest 100 million. Thus, figures presented in this chapter may not exactly equal benefit and cost numbers presented in earlier sections of the chapter.

[b] Not all possible benefits or disbenefits are quantified and monetized in this analysis. Potential benefit categories that have not been quantified and monetized are listed in Table IV.D.–8. Unmonetized PM-and ozone-related benefits are indicated by B_{PM}. And B_{Ozone}, respectively.

[c] B is equal to the sum of all unmonetized benefits, including those associated with PM, ozone, CO, and HAPS.

[d] These estimates are based on the EPA preferred approach for valuing reductions in premature morality, the VSL approach. This approach and an alternative, age-adjusted approach—the VSLY approach—are discussed more fully in section f above.

Table IV.D.–10b.—2030 Annual Monetized Costs, Benefits, and Net Benefits for the Final Tier 2/ Gasoline Sulfur Rule: Alternative Estimates Using the Value of Statistical Life Years Saved Approach to Value Reductions in Premature Mortality [a]

	Billion 1997 (dollars)
Adjusted compliance costs	$5.3
Monetized PM-related benefits [b].	$13.3+$B^{PM}$
Monetized Ozone-related benefits [b].	$0.5+$B^{Ozone}$
Monetized net benefits [c, d]	$8.5+B

Notes:

[a] For this section, all costs and benefits are rounded to the nearest 100 million. Thus, figures presented in this chapter may not exactly equal benefit and cost numbers presented in earlier sections of the chapter.

[b] Not all possible benefits or disbenefits are quantified and monetized in this analysis. Potential benefit categories that have not been quantified and monetized are listed in Table IV.D.–8. Unmonetized PM-and ozone-related benefits are indicated by B_{PM}. And B_{Ozone}, respectively.

[c] B is equal to the sum of all unmonetized benefits, including those associated with PM, ozone, CO, and HAPS.

[d] The VSLY estimate is calculated by amortizing the $5.9 million mean VSL estimate over the 35 years of life expectancy associated with subjects in the labor market studies used to obtain the VSL estimate. The resulting estimate, using a 5 percent discount rate, is $360,000 per life-year saved in 1997 dollars. This approach is discussed more fully in section f above.

V. Other Vehicle-Related Provisions

The section describes several additional provisions of today's final rule that were not previously discussed in this preamble.[108]

A. Final Tier 2 CO, HCHO and PM Standards

Tables IV.B.–4 and –5 in Section IV.B.4.a. above presented the Tier 2 standards for carbon monoxide (CO), formaldehyde (HCHO), and particulate matter (PM). The following paragraphs discuss our selection of these specific standards.

1. Carbon Monoxide (CO) Standards

Beyond aligning carbon monoxide (CO) standards for all LDVs and LDTs, and harmonizing with California vehicle technology, reduction in CO emissions is not a primary goal of the Tier 2 program. However, we note that more than three-fourths of CO emissions in 1997 came from mobile sources and that there are currently 20 officially designated CO nonattainment areas in the U.S. These areas include 47 counties with a combined population of 34 million. In addition, there are 23 officially designated maintenance areas also with a combined population of 34 million. Further, CO is a deadly gas that leads to accidental poisoning fatalities and injuries. Also, CO may play a role in ozone formation by increasing the reactivities of VOCs in the atmosphere.

Although there remain many areas of nonattainment and maintenance for the

[108] Generally the provisions of this section V that apply to HLDTs also apply to MDPVs. See section IV.B.4.g for a thorough discussion of the main program elements and how they impact MDPVs.

CO NAAQS, and those areas include large populations, the broad trends indicate that ambient levels are being reduced and the amount of further reductions needed to meet the CO NAAQS will not be as substantial as for the ozone NAAQS. The reductions in this program will help ensure that emissions and ambient levels of CO continue to decline, which will contribute to the attainment and maintenance of the CO NAAQS in current nonattainment areas. These standards will also ensure that CO levels do not increase in the future, which could exacerbate any CO attainment and maintenance concerns. Our analysis estimating of the tons of CO reduction due to the Tier 2/Gasoline Sulfur program is found in Chapter III of the RIA.

Thus the CO standards we are finalizing for all Tier 2 LDVs and LDTs are essentially the same as those from the NLEV program for LDV/LLDTs. These standards will harmonize with CalLEV II CO standards except at California's SULEV level (EPA Bin 2). This lone divergence will not pose additional burden to manufacturers because the federal Tier 2 CO standards for these vehicles will be less stringent than California's. Bins applicable during the interim programs will include CO values from the NLEV program for LDV/LLDTs and from the Cal LEV I program for HLDTs.[109] In our NPRM, we proposed tighter CO standards than California for certain higher bins. Based upon comment, we are aligning our CO standards with those of California to help ensure that carry over between the two programs can occur.[110] This alignment is consistent with our goal of bringing all LDVs and all categories of LDTs under common standards that allow for technology to be harmonized to the extent possible with California. Despite these minor changes, we still expect the standards in today's rule to lead to CO reductions.

2. Formaldehyde (HCHO) Standards

Similar to our approach to CO standards, we are aligning all Tier 2 LDVs and LDTs under the formaldehyde standards from the NLEV program or CalLEV II program. HLDTs, which are not subject to the NLEV program, will become subject to federal formaldehyde standards for the first time under the provisions of this rulemaking.

Formaldehyde is a hazardous air pollutant and EPA is required to regulate motor vehicle formaldehyde under section 202(l) of the Act. The standards finalized today are primarily of concern for methanol and methane (compressed natural gas or CNG)-fueled vehicles, because formaldehyde is chemically similar to methanol and methane and is likely to be produced when methanol or methane are not completely burned in the engine. HLDTs are not included under the NLEV program and will therefore not face formaldehyde standards as LDVs and LLDTs will in 2001 (1999 in the northeast states). We believe it is appropriate to bring HLDTs under HCHO standards in this rulemaking. Applying formaldehyde standards to HLDTs will be consistent with our goals of aligning standards for all LDVs and LDTs regardless of fuel type and harmonizing technologically with California standards wherever possible and reasonable and the burden will be minimal. Consequently, we are including formaldehyde standards for HLDTs under the Tier 2 program as well as under the interim programs.

3. Use of NMHC Data To Show Compliance with NMOG Standards; Alternate Compliance With Formaldehyde Standards

In response to comments, we are finalizing a provision to allow manufacturers to demonstrate compliance with the interim and Tier 2 NMOG standards using NMHC data (non-methane hydrocarbons) for gasoline and diesel vehicles. For these vehicles, NMOG and NMHC emissions are very similar and testing for NMHC is considerably simpler and cheaper than measuring NMOG. Data available to us show that NMHC emissions at levels expected from interim and Tier 2 LDVs and LDTs can be adjusted to represent NMOG emissions by a small multiplicative factor. We are finalizing to accept NMHC test results to demonstrate compliance with the NMOG standards, but are requiring that the NMHC results be multiplied by 1.04. We will permit the use of other adjustment factors based upon comparative testing.

A drawback to NMHC testing is that NMHC testing does not yield formaldehyde results as NMOG testing does. We noted in the NPRM that HCHO is actually a component of NMOG and that we expect that all vehicles able to meet the proposed Tier 2 or interim standards (including methanol and CNG-fueled vehicles) will readily comply with the HCHO standards. In fact, based upon a review of certification data, we believe that gasoline and diesel vehicles will be far below the HCHO standards, perhaps by as much as 90%. (See the Response to Comments document for details)

To reduce testing costs while harmonizing with the CalLEV II standards we are finalizing a provision that will permit manufacturers of gasoline and diesel vehicles to demonstrate compliance with the formaldehyde standards based on engineering judgement. This provision will apply only to diesel and gasoline fueled vehicles and will require manufacturers to make a demonstration in their certification application that vehicles having similar engine and vehicle size and engine and aftertreatment technologies have been shown to exhibit compliance with the applicable formaldehyde standard for their full useful life. This demonstration will be similar to that currently required for gasoline vehicles to demonstrate compliance with the particulate matter standard (see 40 CFR 86.1829(b)(1)), and should be readily available from California vehicles where NMOG testing is required and formaldehyde data is routinely generated.

4. Particulate Matter (PM) Standards

We proposed to adopt tighter PM standards. For Tier 2 vehicles, we proposed PM bin values such that PM would consistently be 0.01 g/mi or less. To provide manufacturers with flexibility, we proposed a 0.02 g/mi PM standard for vehicles that certify to the highest Tier 2 bins. As we have indicated elsewhere in this preamble, we anticipate that low sulfur diesel fuel will be available by 2007 to enable diesel vehicles to utilize advanced diesel technologies and meet these PM standards.

For the interim standards we proposed a PM standard of 0.06 g/mi for the highest bins. We received considerable comment from manufacturers and others about the PM standards we proposed. In the final rule, we are raising the PM standard to 0.08 g/mi for bin 10. For HLDTs, manufacturers would likely have had to use advanced diesel technologies to attain our proposed interim standards and these technologies require low sulfur diesel fuel. Since we do not expect that fuel to be widely available until the 2006–2007 timeframe, we are raising the PM standard so that diesels are not barred from the interim program by a fuel situation beyond their manufacturers' control.

PM standards are primarily a concern for diesel-cycle vehicles, but they also apply to gasoline and other otto-cycle

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[109] We recognize that the standards we are finalizing for interim LDT4s are more stringent than for equivalent vehicles (MDV3s) under Cal LEV I. Still our interim HLDT standards harmonize with Cal LEV I standards applicable to MDV2s.

[110] Ibid.

vehicles. We will continue to permit otto-cycle vehicles to certify to PM standards based on representative test data from similar technology vehicles.

B. Useful Life

The ''useful life'' of a vehicle is the period of time, in terms of years and miles, during which a manufacturer is formally responsible for the vehicle's emissions performance. For LDVs and LDTs, there have historically been both ''full useful life'' values, approximating the average life of the vehicle on the road, and ''intermediate useful life'' values, representing about half of the vehicle's life. We proposed and are finalizing several changes to the current useful life provisions for LDVs and LDTs.

1. Mandatory 120,000 Mile Useful Life

We are finalizing our proposal to equalize full useful life values for all Tier 2 LDVs and LDTs at 120,000 miles. Congress, in directing EPA to perform the Tier 2 study, also directed EPA to consider changing the useful lives of LDVs and LDTs. Manufacturers have made numerous advances in quality, materials and engineering that have led to longer actual vehicle lives and data show that each year of a vehicle's life, people are driving more miles. Current data indicate that passenger cars are driven approximately 120,000 miles in their first ten years of life. Trucks are driven further. Current regulatory useful lives are 10 years/100,000 miles for LDV/LLDTs and 11 years/120,000 miles for HLDTs. We project, based on our Tier 2 model, that approximately 13 percent of light-duty NO_X and 11 percent of light-duty VOCs is produced between 100,000 and 120,000 miles. Given the trend toward longer actual vehicle lives and increases in annual mileage, we believe that it is reasonable to extend the regulatory useful life requirements California, in its LEV II program, has adopted full useful life standards for all LDVs and LDTs of 10 years or 120,000 miles, whichever occurs first. The time period for federal LDV/LLDTs will be 10 years, but will remain at 11 years for HLDTs consistent with the Clean Air Act. Intermediate useful life values, where applicable, will remain at 5 years or 50,000 miles, whichever occurs first. Where manufacturers elect to certify Tier 2 vehicles for 150,000 miles to gain additional NO_X credits, as discussed below, the useful life of those vehicles will be 15 years and 150,000 miles. We are not harmonizing with California on the mandatory useful life for evaporative emissions of 15 years and 150,000 miles, but rather this useful life will be mandatory for evaporative emissions only when a manufacturer elects optional 150,000 mile exhaust emission certification.

We proposed to extend the useful life of interim LDV/LLDTs to 10 years/120,000 miles beginning in 2004. Based upon extensive comment, we are not finalizing that provision and the useful lives of interim LDV/LLDTs will remain unchanged to help facilitate their carryover from the NLEV program into the interim program. Commenters provided persuasive argument that the proposed provision, along with others, would impose a large workload burden on manufacturers because they would be unable to carry over certification data from 2003 and would have to recertify virtually all of their LDV/LLDTs in 2004. Manufacturers stressed that this would be an especially unproductive use of their resources because these vehicles would all have to be recertified again as they were phased into the Tier 2 standards between 2005 and 2007. This change in the final rule will have only minimal impact on the benefits of our program.

2. 150,000 Mile Useful Life Certification Option

We are adopting as proposed a provision to provide additional NO_X credit in the fleet average calculation for vehicles certified to a useful life of 150,000 miles. A manufacturer certifying a test group to a 150,000 mile useful life will incorporate those vehicles into its corporate NO_X average as if they were certified to a full useful life standard 0.85 times the applicable 120,000 mile NO_X standard. To use this option, the manufacturer will have to agree to (1) certify the engine family to the applicable 120,000 mile exhaust and evaporative standards at 150,000 miles for all pollutants; and (2) increase the mileage on the single extra-high mileage in-use test vehicle from a minimum of 90,000 miles to a minimum of 105,000 miles.

Today's vehicles are lasting longer and being driven farther than those built in past years and we believe it is reasonable to encourage the development of more durable emission control systems. Consequently we believe it is appropriate to provide incentives to manufacturers to certify their vehicles to extended useful lives beyond 120,000 miles. This is why we proposed and are today finalizing additional NO_X credits for Tier 2 vehicles certified to a useful life of 150,000 miles.

In the final rule we are adding an option that, for a test group certified to a 150,000 mile useful life, the manufacturer may choose between the additional credits or a waiver of intermediate life standards. Commenters suggested that some vehicles would be discriminated against by our intermediate life standards, because they might have flat deterioration curves, and could meet our full life standards, but not the lower intermediate life standards. We are reluctant to give up our intermediate life standards, because we believe they provide an additional measure of certainty that vehicles will meet standards. Nonetheless, we believe that certification to a longer useful life is an important goal and that manufacturers who do so will likely use technologies that have very flat deterioration curves. This option provides manufacturers with the flexibility to certify vehicles without having to comply with intermediate life standards. In exchange they must comply with full life standards for considerably longer mileage.

C. Supplemental Federal Test Procedure (SFTP) Standards[111]

1. Background

Supplemental Federal Test Procedure (SFTP) standards require manufacturers to control emissions from vehicles when operated at high rates of speed and acceleration (the US06 test cycle) and when operated under high ambient temperatures with air conditioning loads (the SC03 test cycle). The existing light duty SFTP requirements begin a three year phase-in in model year 2000 for Tier 1 LDV/LLDTs.[112] For HLDTs, SFTP requirements begin a similar phase-in in 2002. Intermediate and full useful life SFTP standards exist for all categories of Tier 1 vehicles except that SFTP standards do not apply to diesel fueled LDT2s and HLDTs. Table V.A.–1 shows the full useful life federal SFTP requirements applicable to Tier 1 vehicles.

[111] SFTP requirements do not apply to MDPVs. We plan to address the applicability of SFTP standards and test procedures to MDPVs in a future rulemaking.

[112] For vehicles included in the NLEV program, this phase-in becomes a four year phase-in beginning in 2001.

TABLE V.A.–1.—FULL USEFUL LIFE FEDERAL SFTP STANDARDS APPLICABLE TO TIER 1 VEHICLES

Vehicle category	NMHC + NO_X (weighted g/mi) [a]	CO (g/mi) [b]		
		US06	SC03	Weighted
LDV/LDT1 (gasoline)	0.91	11.1	3.7	4.2
LDV/LDT1 (diesel)	2.07	11.1	—	4.2
LDT2	1.37	14.6	5.6	5.5
LDT3	1.44	16.9	6.4	6.4
LDT4	2.09	19.3	7.3	7.3

Notes:
[a] Weighting for NMHC+NO_X and optional weighting for CO is 0.35x(FTP)+0.28x(US06)+0.37x(SC03).
[b] CO standards are stand alone for US06 and SC03 with option for a weighted standard.

2. SFTP Under the NLEV Program

The NLEV program includes SFTP requirements for LDVs, LDT1s and LDT2s. These requirements impose the Tier 1 intermediate and full useful life SFTP standards on Tier 1 and TLEV vehicles, but impose only 4000 mile standards adopted from California LEV I program on LEVs and ULEVs.[113]

NLEV SFTP standards for LEVs and ULEVs are shown in Table V.A.–2. Table V.A.–2 also includes the California LEV I SFTP standards for LDT3s and 4s. The standards in that table do not provide for a weighted standard for NMHC+ NO_X or for CO, but rather employ separate sets of standards for the US06 and SC03 tests. Also, while the NLEV and CAL LEV I SFTP standards apply to gasoline and diesel vehicles, they do not include a standard for diesel particulates (PM).

TABLE V.A.–2.—SFTP STANDARDS FOR LEVS AND ULEVS IN THE NLEV/CAL LEV I PROGRAM
[4000 Mile Standards]

	US06		SC03	
	NMHC+NO_X (g/mi)	CO (g/mi)	NMHC+NO_X (g/mi)	CO (g/mi)
LDV/LDT1	0.14	8.0	0.20	2.7
LDT2	0.25	10.5	0.27	3.5
LDT 3 (Calif MDV 2)	0.4	10.5	0.31	3.5
LDT 4 (Calif MDV 3)	0.6	11.8	0.44	4.0

3. SFTP Standards for Interim and Tier 2 LDVs and LDTs: As Proposed

Since no significant numbers of vehicles certified to SFTP standards will enter the fleet until 2001, manufacturers raised concerns during the development of the NPRM regarding significant changes to the SFTP program before its implementation. We stated in the NPRM that it was reasonable not to increase SFTP stringency beyond NLEV/CalLEV I levels for the Tier 2 program, but we proposed to include SFTP standards adjusted for intermediate and full useful life deterioration where there are currently only 4000 mile standards.

Full useful life standards for Tier 2 vehicles are consistent with our mandate under the Clean Air Act. We derived the full and intermediate useful life standards in the NPRM by applying deterioration allowances from our draft MOBILE 6 model to the existing 4000 mile standards for LDVs and LLDTs. For HLDTs we applied similarly derived deterioration allowances to California's LEV I SFTP standards for MDV2s and MDV3s, which are the corresponding categories to LDT3s and LDT4s in the California LEV I program. The full and intermediate useful life SFTP standards we proposed would have applied to all Tier 2 vehicles including Tier 2 LDT3s and LDT4s. Further, since our interim standards are derived from NLEV and Cal LEV I standards, we proposed that our full life SFTP standards would apply to all interim LDV/LLDTs beginning in 2004.[114]

4. Final SFTP Standards for Interim and Tier 2 LDVs and LDTs

Based upon extensive comment from manufacturers, we are persuaded that our proposed intermediate and full life SFTP standards need more review and should possibly be reexamined in a separate rulemaking. Manufacturers were quite concerned that the technique we used to obtain the intermediate and full life SFTP standards led to standards that were overly stringent. They argued that they have little experience with SFTP compliant vehicles given the current infancy of the program and they do not know whether SFTP emissions can be reasonably be expected to deteriorate like FTP emissions. Consequently, in today's notice, we are finalizing a program that will adopt the existing NLEV/Cal LEV I 4000 mile standards and utilize adjusted full life standards from the Tier 1 program, instead of values derived by applying the draft MOBILE 6 model.

These standards will apply to all Tier 2 vehicles and to all interim LDV/LLDTs. We proposed and are finalizing that interim HLDTs meet Tier 1 SFTP standards which do not finish their phase-in until the 2004 model year.

With regard to intermediate and full life SFTP standards, the preamble to the final rule implementing the SFTP program for the Tier 1 SFTP emission standards (61 FR 54856) provided a formula for computing SFTP standards to apply under more stringent future

[113] This disparity arose because neither EPA nor CARB had full useful life SFTP standards for LEVs or ULEVs when the NLEV program was adopted. Since a major requirement of the NLEV program was harmony with California standards, EPA adopted the California SFTP standards in place for the NLEV time frame (2001 and later).

[114] Except that, we proposed to permit TLEV vehicles (EPA interim Bin 10 in Table IV.B.–4), which are not subject to new SFTP standards under NLEV, to continue to meet Tier 1 SFTP standards, and to permit HLDTs under the interim programs to continue to meet Tier 1 SFTP standards that do not fully phase in until the 2004 model year.

FTP standards. In the Tier 1 program, SFTP standards represent a weighted average of FTP, US06 and SC03 standards. The three components are weighted by factors of 0.35, 0.28, and 0.37 respectively. The formula simply adjusts the Tier 1 *SFTP* weighted average standards downward to reflect the decrease in the component *FTP* standards. The weighting factors remain the same and the US06 and SC03 standards remain the same, but the SFTP standard becomes tighter because the FTP component becomes smaller. These standards will take effect for all LDV/LLDTs beginning in 2004 and will phase in with the Tier 2 standards for HLDTs in 2008 and 2009. The formula is as follows:

New SFTP Standard = Old SFTP Standard − [0.35 × (Tier 1 FTP standard − New FTP Standard)]

In today's final rule, we will employ this formula to compute full useful life SFTP standards for all Tier 2 vehicles and for interim LDV/LLDTs. Because we are also adopting the California 4000 mile SFTP standards for these vehicles, we are not adopting intermediate life SFTP standards, so as to avoid the burden of three sets of SFTP standards.

LDT3 and LDT4 SFTP standards do not currently apply to diesels. Further, the standards applicable to Tier 1 diesel LDVs and LDT1s are less stringent than gasoline standards and do not apply to the SC03 cycle. There are no SFTP standards under Tier 1 for diesel LDT2s. In this final rule, we are applying the same approach we are using with other standards in this document to the Tier 2 and interim SFTP standards. Consequently, we are finalizing that Tier 2 vehicles and interim LDV/LLDTs with diesel or gasoline engines must comply with the same $NMHC+NO_X$ and CO SFTP limits. Thus, in computing Tier 2 SFTP full life standards for diesel LDVs and LDT1s from Tier 1 values, the values for diesels must be determined from the standards applicable to gasoline vehicles of the same category.

Because we lack certainty as to whether diesel vehicles can comply with the 4,000 mile SFTP standards for gasoline vehicles that we are adopting from the NLEV and Cal LEV I programs, we are providing an option that diesel LDV/LLDTs may comply with intermediate life SFTP standards instead.[115] Manufacturers must calculate intermediate life standards using the same approach described for full life standards, but must substitute appropriate intermediate life values in the equation above. This provision will only apply through model year 2006, and thus will likely only impact interim non-Tier 2 vehicles, given the very small market share that diesels occupy and given our expectation that they will be the last LDV/LLDTs phased into Tier 2 standards. We noted above that interim non-Tier 2 HLDTs will have the option of meeting Tier 1 SFTP standards. Thus diesel HLDTs will not have to comply with the 4,000 mile standards in the interim years and the option we are providing for LDV/LLDTs is not needed for HLDTs.

5. Adding a PM Standard to the SFTP Standards

We requested comment on the appropriate SFTP PM standards for diesel vehicles. We suggested it would be appropriate to establish a margin above the applicable FTP PM standard to serve as the SFTP standard. EPA has implemented such margins in recent consent decrees, under which heavy-duty engine manufacturers have agreed not to exceed emission levels 1.25 times the applicable exhaust standards (including PM standards) when engines are operated over a wide range of operating conditions. We received comments in favor of an SFTP PM standard of 1.25 times the FTP standard and we received many comments from manufacturers against setting any SFTP PM standard until more data become available.

We believe it is reasonable to include an SFTP standard for PM. However, we are uncertain as to the technical appropriateness of the 1.25 value for passenger vehicles. Further, the 1.25 value would lead to an SFTP standard for PM that would not match the stringency of the other SFTP standards we are finalizing. Consequently, we are finalizing a procedure for computing diesel PM standards that is nearly identical to the procedure for computing weighted SFTP standards for $NMHC+NO_X$ and CO described above. We believe standards computed in this way will be readily feasible for both gasoline and diesel vehicles.

To compute the SFTP PM standards, manufacturers will use the same formula described above for $NMHC+NO_X$ and CO. Where that formula calls for the Tier 1 *SFTP* standard to be inserted, manufacturers must insert the Tier 1 *FTP* standard. This is because, under Tier 1 standards, there is no SFTP standard for PM. However, the Tier 1 weighted SFTP standards are equal to the Tier 1 FTP standards (or the sum of the Tier 1 FTP standards in the case of $NMHC+NO_X$). Using the Tier 1 FTP PM standards in this way will lead to a Tier 2 SFTP PM standard whose stringency is appropriately matched to the other pollutants.

For HLDTs , we proposed and are finalizing that Tier 1 SFTP standards would apply through the interim program. because of the late start of SFTP phase-in for Tier 1 vehicles. We see no reason to impose SFTP PM standards on these vehicles during the interim period when their manufacturers will be under pressure to develop diesel vehicles to comply with the Tier 2 standards. Also, if we were to impose an FTP PM standard on the interim vehicles, it would likely be matched to the interim phase in for HLDTs and manufacturers would simply defer compliance for diesels until the last phase-in year (2007). The manufacturers would then have to recertify to the Tier 2 standards by 2009. Given the relatively small number of diesel vehicles, we believe the most reasonable approach is to defer SFTP PM standards for HLDTs until the Tier 2 phase-in. Consequently, we are finalizing that Tier 2 HLDTs will have to comply with an SFTP PM standard computed as described above.

For LDV/LLDTs we are also including the SFTP PM standard for the Tier 2 vehicles. There are only a few diesel LDV/LLDTs currently produced and no large increase in their numbers is expected. We see little environmental benefit in imposing the SFTP PM standard on interim vehicles.

6. Future Efforts Relevant to SFTP Standards

We are very concerned about ''off cycle'' emissions, *i.e.* those emissions that occur under vehicle operational modes that are not captured in the FTP. SFTP standards help to address our concerns and we believe that they should apply to all vehicles, regardless of fuel. Our final rule essentially promulgates Tier 1 SFTP standards that are reduced to represent the reduction in the FTP component standards. As we indicate under our discussion of SFTP for medium duty passenger vehicles (see section IV.B.4.g) we expect to conduct a rulemaking to establish appropriate ''Tier 2'' SFTP standards for all Tier 2 vehicles. In that rule, we expect to reexamine the US06 and SC03 test cycles and their applicability to vehicles using different fuels and technologies,

[115] The 4,000 mile standards under NLEV are phased-in in such a way that diesels would not likely be subject to them until the 2004 model year, given their very small market share. Today's rulemaking effectively supercedes the NLEV program beginning with the 2004 model year. In other words, while NLEV contains 4,000 mile SFTP standards for diesels, they are not likely to ever impact diesel LDV/LLDTs.

including whether these cycles are the most appropriate ones for diesels. We will also examine whether it is necessary to have different sets of standards for different vehicle sizes or whether it is possible to establish one set of standards for all vehicles.

D. LDT Test Weight

Historically, HLDTs (LDT3s and LDT4s) have been emission tested at their adjusted loaded vehicle weight (ALVW), while LDVs, LDT1s, and LDT2s have been tested at their loaded vehicle weight (LVW). ALVW is equivalent to the curb weight of the truck plus half its maximum payload, while LVW is equivalent to the curb weight of the truck plus a driver and one adult passenger (300 pounds). As we are equalizing standards and useful lives across LDVs and all categories of LDTs, we believe it is appropriate to test all the vehicles under the same conditions. Therefore, we are finalizing as proposed to test HLDTs at their loaded vehicle weight. We believe this is appropriate because the standards we are imposing on HLDTs under Tier 2 are considerably more stringent than the Tier 1 standards. Further, one of our reasons for bringing HLDTs under the same standards as passenger cars is that these trucks include many vans and sport utility vehicles that are often used as passenger cars with just one or two passengers. Lastly, we note that testing HLDTs at LVW is consistent with the way they have been tested for fuel economy purposes for many years. Consequently, we believe it is appropriate to test them at LVW.

The NPRM proposed that all HLDTs would certify using LVW beginning in the 2004 model year. Based upon comments, the final rule will allow the certification of HLDTs based on ALVW until those vehicles are phased into the Tier 2 standards in 2008 and 2009 at which time they must be tested at LVW. This will enhance carryover of California vehicles to the Federal interim program in cases where the California vehicles meet our interim standards.

E. Test Fuels

As discussed elsewhere in this preamble, the NLEV program was adopted virtually in its entirety from California's program. Because California's standards were developed around the use of California Phase II reformulated gasoline (RFG) as the exhaust emission test fuel, we adopted California Phase II test fuel as the exhaust emission test fuel for gasoline-fueled vehicles in the federal NLEV program, although we recognized at the time that vehicles outside of California would be unlikely to operate on that fuel in use. In the NPRM we proposed interim programs that were derived from NLEV (for LDV/LLDTs) and the CAL LEVI program (for HLDTs), and we proposed to accept certification test results generated on California fuel, but indicated that we might test or require in-use testing on federal fuel.

Based upon comment we are finalizing provisions to permit, for interim vehicles, that if a test group has been certified to the exhaust emission standards using California fuel and is being carried into the interim program from NLEV or is being carried across from California LEV I certification, then we will not test or require in-use exhaust testing on federal fuel. This change is intended to help address recertification workload concerns raised by manufacturers. For new certification not carried across from California LEV I or carried over from NLEV, and for any Tier 2 vehicles, we will accept exhaust certification test results based on California fuel for 50 state vehicles only, but we will reserve the right to perform or require certification confirmatory testing and in-use testing on federal test fuel.

We recognize that manufacturers may want to perform calibration changes on vehicles carried across from the California LEV I program or carried over from NLEV program. These calibration changes will likely be aimed at certifying the test group to the lowest possible NO_X value. We believe that these calibration changes would be appropriate, provided they can still be covered by the existing worst case durability data vehicle. We will perform or require certification confirmatory testing and in-use emission testing on these vehicles using California fuel.

Because differences exist between the California and federal evaporative emission testing procedures, we proposed to continue to require the use of federal certification fuel as the test fuel in evaporative emission testing. Under current programs, where California and federal evaporative emission standards are essentially the same, California accepts evaporative results generated on the federal procedure (using federal test fuel), because available data indicates the federal procedure to be a ''worst case'' procedure. The evaporative standards California has adopted for their LEV II program are more stringent than those we are finalizing in this document. In the NPRM, we requested comment and supporting emission test data on whether vehicles certified to CalLEV II evaporative standards using California fuels will necessarily comply with the federal Tier 2 evaporative standards, including ORVR standards, when tested with federal test fuel. While we got comments from manufacturers advocating that we accept the results of California evaporative testing to demonstrate compliance with the federal evaporative standards, we received no supporting data. Still, given the fairly large difference between California and federal evaporative standards, it seems reasonable that a vehicle meeting the California standards under California fuels and test conditions might also meet federal standards under federal fuels and conditions. We believe it may be possible for manufacturers to establish a relationship between the two sets of standards, fuels and conditions that would enable us to grant federal certification based upon data showing conformity with the California standards under California fuels and conditions. Consequently, we are including a provision in the certification regulations to enable manufacturers to obtain federal evaporative certification based upon California results, if they obtain advance approval from EPA. EPA will review test data from manufacturers to establish whether it is appropriate to accept California data to demonstrate compliance with federal standards.

F. Changes to Evaporative Certification Procedures To Address Impacts of Alcohol Fuels

Current certification procedures, including regulations under the new CAP2000 program,[116] allow manufacturers to develop their own durability process for calculating deterioration factors for evaporative emissions. The regulations (§ 86.1824–01) permit manufacturers to develop service accumulation (aging) methods based on ''good engineering judgement''. The manufacturer's durability process must be designed to predict the expected evaporative emission deterioration of in-use vehicles over their full useful lives. We proposed and are finalizing requirements that these aging methods include the use of alcohol fuels to address concerns that alcohol fuels increase the permeability and thus the evaporative losses from hoses and other evaporative components. Based upon comment, we are also finalizing an option to the requirement that the manufacturer use the alcohol fuel. Under this option, the manufacturer may demonstrate to EPA using good engineering judgement

[116] The Compliance Assurance Program, (64 FR 23906) takes effect in the 2000 model year.

acceptable to EPA that its durability process for calculating evaporative emission deterioration factors accurately predicts deterioration under prolonged exposure to alcohol fuels.

We have reviewed data indicating that the permeability, and therefore the evaporative losses, of hoses and other evaporative components can be greatly increased by exposure to fuels containing alcohols.[117] Alcohols have been shown to promote the passage of hydrocarbons through a variety of different materials commonly used in evaporative emission systems. Data from component and fuel line suppliers indicate that alcohols cause many elastomeric materials to swell, which opens up pathways for hydrocarbon permeation and also can lead to distortion and tearing of components like ''O'' ring seals. Ethers such as MTBE and ETBE have a much smaller effect. Alcohol-resistant materials such as fluoroelastomers are available and are currently used by manufacturers to varying extents.

Alcohols do not impact evaporative components and hoses immediately, but rather it may take as long as one year of exposure to alcohol fuels for permeation rates to stabilize. The end result is higher permeation and increased in-use evaporative emissions.[118]

Today, roughly 10% of fuel sold in the U.S. contains alcohol, mainly in the form of ethanol, and such fuels are often offered in ozone nonattainment areas. We believe it is appropriate to ensure that evaporative certification processes expose evaporative components to alcohols and do so long enough to stabilize their permeability. Therefore, we are finalizing our proposal to the evaporative certification requirements to require manufacturers to develop their deterioration factors using a fuel that contains the highest legal quantity of ethanol available in the U.S.

To implement this change, we are modifying the Durability Demonstration Procedures for Evaporative Emissions found at § 86.1824–01. The amendments will require manufacturers not using an approved option, to age their systems using a fuel containing the maximum concentration of alcohols allowed by EPA in the fuel on which the vehicle is intended to operate, *i.e.,* a ''worst case'' test fuel. (Under current requirements, this fuel would be about 10% ethanol, by volume.) We are also modifying the Durability Demonstration Procedures to require manufacturers to ensure that their aging procedures are of sufficient duration to stabilize the permeability of the fuel and evaporative system materials. These modifications will take place as vehicles are phased into the evaporative emission standards contained in this final rule.

We requested comment on alternative ways by which manufacturers could document or demonstrate that their components are made of materials whose permeability is not significantly affected by alcohols. We received no comments responsive to this request, but we did receive comments that EPA should not change the CAP2000 provision allowing manufacturers to develop their own durability process for calculating evaporative emission deterioration factors ''using good engineering judgement''. We do not wish to foreclose the possibility that an alternative method may exist or may arise in the future. Consequently, in the final rule we will permit manufacturers to use an optional method based on good engineering judgement acceptable to EPA. As an example, one method would be for the manufacturer to show that it is exclusively using materials documented in the technical literature to have low permeability in the presence of alcohols.

G. Other Test Procedure Issues

California's LEV II program implements a number of minor changes to exhaust emissions test procedures. We have evaluated these changes and found that, for tailpipe emissions, the California test procedures fall within ranges and specifications permitted under the Federal Test Procedure.

With regard to hybrid electric vehicles (HEVs) and zero emission vehicles (ZEVs), we believe that these vehicles will be predominantly available in California, or that they will typically be first offered for sale in California, because of California's ZEV requirement, which promotes the sale of HEVs and ZEVs. Where manufacturers market HEVs or ZEVs outside of California, it is likely that they will market the same vehicles in California. Consequently, we are finalizing our proposal to incorporate by reference California's exhaust emission test procedures for HEVs and ZEVs.[119]

In the NLEV program, we provided a specific formula used by California that could be used to compute an HEV contribution factor to NMOG emissions. This formula took into consideration the range without engine operation of various types of HEVs and had the effect of reducing the NMOG emission standard for a given emission bin (for HEV vehicles only). This would have obvious beneficial effects on a manufacturer's calculation of its corporate NMOG average.

The technology of HEVs is under rapid change and we do not believe that we can design a formula now that will accurately predict the impact of HEVs on corporate average NO_X emissions in the Tier 2 time frame. Consequently, we are finalizing the proposed provision by which manufacturers could propose HEV contribution factors for NO_X to EPA. If approved, these factors can be used in the calculation of a manufacturer's fleet average NOx emissions and will provide a mechanism to credit an HEV for operating with no emissions over some portion of its life.

These factors will be based on good engineering judgement and will consider such vehicle parameters as vehicle weight, the portion of the time during the test procedure that the vehicle operates with zero emissions, the zero emission range of the vehicle, NO_X emissions from fuel-fired heaters and any measurable NO_X emissions from on-board electricity production and storage.

The final NLEV rule (*See* 62 FR pg 31219, June 6, 1997) incorporated by reference California's NMOG measurement procedure and adopts California's approach of using Reactivity Adjustment Factors (RAFs) to adjust vehicle emission test results to reflect differences in the impact on ozone formation between an alternative-fueled vehicle and a vehicle fueled with conventional gasoline. As has been discussed elsewhere in this preamble, the NLEV program is a special case in which California standards and provisions were adopted virtually in their entirety. In the preamble to the final NLEV rule (*See* 62 FR 31203), we expressed our reservations about the use of RAFs. We also addressed our reservations about the use of reactivity factors developed in California in a program that spans a range of climates and geographic locations across the United States in the final rule on reformulated gasoline (RFG) (see 59 FR 7220). We continue to be concerned about the validity of RAFs to predict ozone formation nationwide and asked the National Academy of Sciences to

[117] Numerous SAE papers examine the permeability of fuel and evaporative system materials as well as the influence of alcohols on permeability. See, for example SAE Paper #s 910104, 920163, 930992, 970307, 970309, 930992, and 981360, copies of which are in the docket for this rulemaking.

[118] *Ibid.*

[119] California Exhaust Emission Standards and Test Procedures for 2003 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid Electric Vehicles. In the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes; adopted August 5, 1999.

look at the scientific evidence in support of the use of these factors nationwide. While we have recently received a report from NAS,[120] we have not yet developed a final position on how RAFs should be treated in federal regulations. We are finalizing as proposed not to permit the use of RAFs in the Tier 2 program.

The issue of RAFs is relevant primarily to alcohol and CNG-fueled vehicles. RAFs are not relevant at all if a manufacturer elects to use NMHC data to show compliance with the NMOG standards. While, in our final rule, alcohol and CNG vehicles will have to comply with NMOG standards beginning in 2004 and while we desire to harmonize with California when practical and reasonable, we will not permit the use of RAFs for Tier 2 vehicles and interim non-Tier 2 vehicles. We note that we are finalizing a provision from the NPRM that permits dual fueled and flexible fueled vehicles to elect an NMOG value from the next higher bin when they are tested on an alternative fuel. This provides flexibility in compliance with applicable NMOG standards for these vehicles. We do not believe that dedicated alcohol or CNG vehicles should have any problems complying with the NMOG standards we are finalizing and consequently the relief these vehicles might get when RAFs are employed is unnecessary.

In its LEV II program, California is also implementing a number of changes to evaporative emission test procedures.[121] Many of these changes address the evaporative emission testing of hybrid electric vehicles. We proposed not to adopt California's changes, because California uses different test temperatures and different test fuel in its evaporative emission testing of gasoline vehicles than we use in the federal program. The preamble to the final NLEV rule (*See* 62 FR 31227) explains that California and EPA are reviewing an industry proposal to streamline and reconcile the California and federal procedures. That work has not been completed. However, where California adopts procedures specific to HEVs and ZEVs, we are adopting those procedures, except that our testing will occur at lower temperatures, and use a fuel determined by EPA to be representative of federal usage (for HEVs only).

H. Small Volume Manufacturers

Our final rule includes the following flexibilities intended to assist all manufacturers in complying with the stringent proposed standards without harm to the program's environmental goals as presented in the NPRM:

- A four year phase-in of the standards for LDV/LLDTs;
- A delayed phase-in for HLDTs;
- The freedom to select from specific bins of standards;
- A standard that can be met through averaging, banking and trading of NO_X credits;
- Provisions for NO_X credit deficit carryover; and,
- Provisions for alternative phase-in schedules.

These flexibilities apply to all manufacturers, regardless of size, and in general we believe they eliminate the need for more specific provisions for small volume manufacturers.[122] However, we proposed and are finalizing one additional flexibility for small volume manufacturers. Today's rule exempts small volume manufacturers from the 25%, 50% and 75% Tier 2 phase-in requirements applicable to the 2004, 2005 and 2006 LDV/LLDTs and the 50% phase-in requirement applicable to 2008 HLDTs. Instead, small volume manufacturers will simply comply with the appropriate Tier 2 100% requirement in the 2007 and 2009 model year. In the phase-in years, small volume manufacturers will simply comply with the appropriate interim standards for all of their vehicles, except that we will also exempt small volume manufacturers from the 25%, 50% and 75% phase-in requirements for the 0.20 g/mi corporate average NO_X standard applicable to interim HLDTs in 2004–2006. Small volume HLDT manufacturers must simply comply with the interim standards, including the corporate average NO_X standard, in 2007 for 100% of their vehicles. During model years 2004–2006, these same small volume manufacturers must comply with any of the applicable bins of standards for 100% of their HLDTs.[123, 124] Provisions to deal with the leadtime issue related to HLDTs and outlined in section IV.B. apply to small volume manufacturers. Therefore unless the small volume manufacturer wants to use the optional NMOG standards for interim LDT2s and LDT4s, it may optionally meet the Tier 1 standards for its 2004 model year HLDTs, provided it commences its model year for those vehicles before the fourth anniversary date of today's rulemaking.

As explained in the NPRM, we will continue to apply the federal small volume manufacturer provisions, which provide relief from emission data and durability showing and reduce the amount of information required to be submitted to obtain a certificate of conformity. In addition, the CAP2000 program contains reduced in-use testing requirements for small volume manufacturers.

Exempting small volume manufacturers from the Tier 2 and interim HLDT phase-in requirements eliminates a dilemma that phase-in percentages can pose to a manufacturer that has a limited product line, *i.e.,* how to address percentage phase-in requirements if the manufacturer makes vehicles in only one or two test groups. We have implemented similar provisions for small entities in other rulemakings. Approximately 15–20 manufacturers that currently certify vehicles, many of which are independent commercial importers (ICIs), will qualify. These manufacturers represent just a fraction of one percent of LDVs and LDTs produced. We do not believe that this provision will have any measurable impact on air quality.

1. Special Provisions for Independent Commercial Importers (ICIs)

We requested comment in the NPRM as to whether ICIs should be exempted from the interim and Tier 2 fleet average NO_X standards. We explained that ICIs may not be able to predict their sales and control their fleet average emissions because they may be dependent upon vehicles brought to them by individuals attempting to import uncertified vehicles. We noted that the NLEV program is optional for ICIs and that ICIs are specifically prohibited, under existing regulations, from complying with the fleet average NMOG standard under the NLEV program. (*See* 40 CFR 85.1515(c)). Also, the existing regulations specifically bar ICIs from participating in any emission related averaging, banking or trading program. (*See* 40 CFR 85.1515(d)). We expressed our concern that if we do not amend this provision, ICIs would likely just pick the least stringent bin available to certify their vehicles. This would create an inequity for other manufacturers,

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[120] Ozone-Forming Potential of Reformulated Gasoline, May 1999. National Academy of Sciences; National Academy Press. Available from the NAS web site: http://www.nap.edu.

[121] California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles. Adopted August 5, 1999.

[122] We define small volume manufacturers to be those with total U.S. sales of less than 15,000 highway units per year. Independent commercial importers (ICIs) with sales under 15,000 per year are included under this term.

[123] For a graphical illustration of the phase-ins through time, see Table IV.B.–2.

[124] 2005–2006 for vehicles where the small volume manufacturer commences its 2004 model year for all its 2004 vehicles before the fourth anniversary date of the signature of this rule.

especially other small volume manufacturers that must comply with the fleet average NO_X standards.

Since we do not believe it is wise to finalize a provision that could lead to an inequity like this, and since averaging may not be workable for ICIs, we are finalizing that ICIs must comply with the standards from the bin that contains the relevant fleet average NO_X standard, *e.g.,* in model years 2007 and later an ICI would have to use bin 5 or below for all of its LDV/LLDTs. However, if an ICI is able to purchase credits or to certify to bins below the one containing the fleet average NO_X standard, we will permit the ICI to bank credits for future use. Where an ICI desires to certify to bins above the fleet average standard, we will permit them to do so if they have adequate and appropriate credits. Where an ICI desires to certify to bins above the fleet average standard and does not have adequate or appropriate credits to offset the vehicles, we will permit the manufacturer to obtain a certificate for vehicles using those bins, but will condition the certificate such that the manufacturer can only produce vehicles if it first obtains credits from other manufacturers or from other vehicles certified to lower bins during that model year.

We do not believe that ICIs can predict or estimate their sales of various vehicles well enough to participate in a program that will allow them leeway to produce some vehicles to higher bins now, knowing that they will sell vehicles from lower bins later. We also do not believe that we can reasonably assume that an ICI that certifies and produces vehicles one year, will certify or even be in business the next, consequently, we are also not permitting ICIs to utilize the deficit carryforward provisions of the rule.

Essentially, ICIs will be allowed the major benefits of the averaging, banking and trading program, but will be constrained from getting into a situation where they can ever produce vehicles to higher bins that they can not cover with credits at the time they produce the vehicles.

2. Hardship Provision for Small Volume Manufacturers

The panel convened under the Small Business Regulatory Enforcement Fairness Act recommended that we seek comment on the inclusion of a hardship provision. We requested comment on whether we should include such a provision in the NPRM. Based upon comment, we are including a limited hardship provision in the final rule that will be applicable to small volume manufacturers.

Small volume manufacturers include companies that independently import motor vehicles (Independent Commercial Importers or ICIs), companies that modify vehicles to operate on alternative fuels, companies that produce specialty vehicles by modifying vehicles produced by others, and companies that produce small quantities of their own vehicles, but rely on major manufacturers for engines and other vital emission related components. In these businesses, predicting sales is difficult and it is often necessary to rely on others for technology.

This provision will provide limited relief in the case where a small volume manufacturer is unable to comply with the phase-in dates or average NO_X standard. The manufacturer will need to provide evidence that, despite its best efforts, it cannot meet implementation dates or required NO_X averages.

Appeals for hardship relief must be made in writing, must be submitted before the earliest date of noncompliance, must include evidence that the noncompliance will occur despite the manufacturer's best efforts to comply and must include evidence that severe economic hardship will be faced by the company if the relief is not granted. Hardship relief will only be granted for the first year after a new standard is finally implemented. For small volume manufacturers, which are already exempted from the phase-in schedules for the interim and Tier 2 programs, this means that relief would be available for the final phase-in year for the LDV/LLDT Tier 2 phase-in (2007), for the final phase-in year for the interim HLDT phase-in (2007), and the final phase-in year for the Tier 2 HLDT phase-in (2009). Relief will also be available for manufacturers that did not opt into NLEV and must meet our interim standards for all their LDV/LLDTs in 2004, and relief will be available for HLDTs and MDPVs which must be brought under our interim program in the 2004 model year.

We will work with the applicant to ensure that all other remedies available under this rule, e.g., use of banked or purchased credits, are exhausted before granting additional relief, and will limit the period of relief to one year. Note that in our discussion of the credit deficit carryforward provision in section IV.B.4.d.vi, we indicate that we are not permitting small volume manufacturers to carry deficits forward until they have demonstrated compliance with the NO_X averaging provisions for one year. This is to prevent small volume manufacturers, that have already received additional time due to the waiver of the phase-in requirements, from gaining even more time to finally comply through the credit deficit carryforward provisions.

To avoid this provision creating a self-implementing problem, by which the very existence of the hardship provision prompts small volume manufacturers to delay development, acquisition and application of new technology, we want to make clear that we expect this provision to be rarely used. Our final rule contains numerous flexibilities for all manufacturers and it waives the phase-in steps for small volume manufacturers, which effectively provides them more time. We expect small manufacturers, to prepare for the applicable implementation dates in today's rule.

I. Compliance Monitoring and Enforcement

1. Application of EPA's Compliance Assurance Program, CAP2000

The CAP2000 program (64 FR 23905, May 14, 1999) streamlines and simplifies the procedures for certification of new vehicles and will also require manufacturers to test in-use vehicles to monitor compliance with emission standards. The CAP2000 program was developed jointly with the State of California and involved considerable input and support from manufacturers. As the name implies, it can be implemented as early as the 2000 model year.

We are finalizing our proposal that the Tier 2 and the interim requirements will be implemented subject to the requirements of the CAP2000 program. Certain CAP2000 requirements are being slightly modified to reflect changes to useful lives, standard structure and other aspects of the Tier 2 program, but we proposed no major changes to fundamental principles of the CAP2000 program, and we are not adding any major changes with today's final rule.

Although we proposed changes to useful lives, we did not propose to amend the 50,000 mile minimum mileage used in manufacturer in-use verification testing or in-use confirmatory testing under the CAP2000 program at this time. The CAP2000 in-use program is not yet implemented and we believe it is appropriate to allow manufacturers to gain experience with procuring and testing vehicles at the 50,000 mile level before making significant changes. However, where one vehicle from each in-use test group would have a minimum mileage of 75,000 miles under the CAP2000 program, we proposed and are finalizing, consistent with California, to change that figure to 90,000 miles for Tier 2 vehicles.

We may, in our own in-use program, procure and test vehicles at mileages higher than 50,000 and pursue remedial actions (e.g., recalls) based on that data. We may also use that data as the basis to initiate a rulemaking to make changes in the CAP2000 in-use requirements, if the data indicate significant non-conformity at higher mileages.

We are finalizing certification test fuel specifications consistent with our final fuel sulfur requirements. Given the phase-in for low sulfur fuel we are finalizing in this rulemaking, we recognize that 2004 to 2007 vehicles (and vehicles certified in earlier model years to bank early NO_X credits) may be exposed to higher sulfur levels early in their lives. Because of this sulfur exposure, these vehicles could experience problems with OBD indicator light illuminations.

Consistent with our approach under the NLEV program, we will consider requests from manufacturers to permit OBD systems that function properly on low sulfur fuel, but exhibit sulfur-induced passes when operated on higher sulfur fuel. For OBD systems that exhibit sulfur-induced indicator light illumination, we will consider requests to modify such vehicles on a case-by-case basis.

2. Compliance Monitoring

We plan no new compliance monitoring activities or programs for Tier 2 vehicles. These vehicles will be subject to the certification and manufacturer in-use testing provisions of the CAP2000 rule. Also, we expect to continue our own in-use testing program for exhaust and evaporative emissions. We will pursue remedial actions when substantial numbers of properly maintained and used vehicles fail any standard in either in-use testing program.

Consistent with our approach under NLEV we will consider requests, prior to manufacturer or EPA in-use testing to permit preconditioning procedures designed solely to remove the effects of high sulfur gasoline on vehicles produced through the 2007 model year.

We retain the right to conduct Selective Enforcement Auditing of new vehicles at manufacturer's facilities. In recent years, we have discontinued SEA testing of new LDVs and LDTs, because compliance rates were routinely at 100%. We recognize that the need for SEA testing may be reduced by the low mileage in-use testing requirements of the CAP2000 program. However, we expect to re-examine the need for SEA testing as standards tighten under the NLEV, interim, and Tier 2 programs.

We have established a data base to record and track manufacturers' compliance with NLEV requirements including the corporate average NMOG standards. We expect to monitor manufacturers' compliance with the Tier 2 and interim corporate average NO_X standards in a similar fashion and also to monitor manufacturers' phase-in percentages for Tier 2 vehicles.

3. Relaxed In-Use Standards for Vehicles Produced During the Phase-in Period

The Tier 2 standards will be challenging for manufacturers to achieve, and some vehicles will pose more of a challenge than others. Not only will manufacturers be responsible for assuring that vehicles can meet the standards at the time of certification, they will also have to ensure that the vehicles comply when self-tested in-use under the provisions of the CAP2000 program, and when tested by EPA under its in-use (''Recall'') test program.

With any new technology, or even with new calibrations of existing technology, there are risks of in-use compliance problems that may not appear in the certification process. In-use compliance concerns may discourage manufacturers from applying new technologies or new calibrations. Thus, we proposed and are finalizing, relaxed in-use standards for those bins most likely to require the greatest applications of effort, to provide assurance to the manufacturers that they will not face recall if they exceed standards by a specified amount.

For the first two years after a test group meeting a new standard is introduced, that test group will be subject to more lenient in-use standards. These ''in-use standards'' will apply only to bin 5 and below, only for the pollutants indicated, and only for the first two model years that a test group is certified under that bin. The in-use standards will not be applicable to any test group first certified to a new standard after 2007 for LDV/LLDTs or after 2009 for HLDTs.

The temporary in-use standards are shown in Table V.A.–3 below.

TABLE V.A.–3.—IN-USE COMPLIANCE STANDARDS (G/MI)

[Certification standards shown for reference purposes]

Bin	Durability period (miles)	NO_X In-use	NO_X certification	NMOG in-use	NMOG certification
5 ..	50,000	0.05		n/a	0.075
5 ..	120,000	0.10	0.07	n/a	0.090
4 ..	120,000	0.06	0.04	n/a	0.070
3 ..	120,000	0.05	0.03	0.09	0.055
2 ..	120,000	0.03	0.02	0.02	0.010

Because we are concerned that diesel vehicles may require low sulfur fuel to comply with our interim requirements and that such fuel may not be widely available until the 2006–2007 timeframe, we are providing in-use standards specifically for diesel vehicles certified to bin 10 standards. These standards will be determined by multiplying the applicable NO_X and PM certification standards by factors of 1.2 and 1.35, respectively. These multipliers can be used only for years during which bin 10 is viable, only for diesels and only for the pollutants indicated.

We believe manufacturers should and will strive to meet certification standards for the full useful lives of the vehicles, but we recognize that the existence of such in-use standards poses some risk that a manufacturer might aim for the in-use standard in its design efforts rather than the certification standard, and thus market less durable designs. We do not believe that risk to be significant. We believe that such risks are more than balanced by the gains that can result from earlier application of new technology or new calibration techniques that might occur in a scenario where in-use liability is slightly reduced. Further, we believe that the in-use standards will be of short enough duration that any risks are minimal.